

**Labor Utilization
and Operating Practices
in Table Service Restaurants**

Marketing Research Report No. 931

**Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE**

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Washington, D.C.

Issued September 1971

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price \$1.00 Stock Number 0100-1429

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PREFACE

The research presented in this report was jointly sponsored by the National Restaurant Association, Chicago, Ill., and the U.S. Department of Agriculture. The productive man-hour requirements and percent labor utilization were developed by the University of Delaware through a cooperative agreement.

Acknowledgment is given to Donald Greenway, formerly Executive Vice-President; Vernon E. Cordell, Director of Research, Public Health and Safety; and the Research Committee of the National Restaurant Association for assistance rendered in selecting participating restaurants and reviewing the findings of this research. Special credit is due to the owners and operators of the following restaurants who made their facilities available for detailed studies: A and G Restaurants, New Orleans, La.; Alfred's of Houston, Houston, Tex.; Blair Mansion Inn, Washington, D.C.; The Careless Navigator Restaurant and Scuttlebutt Lounge, St. Petersburg, Fla.; Chateau Fleur de Lis, Atlanta, Ga.; Clark Restaurant Enterprises, Seattle, Wash.; Doro's Restaurant, San Francisco, Calif.; Grassfield's Restaurant, Chicago, Ill.; Kernwood Restaurant, Boston, Mass.; Paul Shank Associates, Inc., Scottsdale, Ariz.; Regan's Restaurant, Kansas City, Mo.; and Rhodeway Inn, Salt Lake City, Utah.

The study was conducted under the general direction of R. W. Hoecker, Assistant Director, Transportation and Facilities Research Division, Agricultural Research Service.

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Labor Utilization and Operating Practices In Table Service Restaurants

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SUMMARY

The average family-type and occasion-type restaurant participating in this study could reduce labor costs approximately \$29,400 annually through improved scheduling and supervision. These savings were developed from the 1967 operating statements of the firms that participated in the study. The average performance percentage in family-type restaurants was 78 percent and in occasion-type restaurants, 74 percent.

Employees in family-type restaurants were scheduled 4 percent more effectively than in occasion-type restaurants. This percentage indicates that management has more effective control over productivity in smaller restaurant operations (square feet of area) with fewer employees.

The average family-type restaurant that participated in this study required 16.3 productive man-hours per 100 customers for direct labor; and the average occasion-type restaurant required 53.5. These direct labor man-hour requirements for personnel working in meat and vegetable, salad, warewashing, customer service, and bar departments account for 81 percent of the total work force in family-type restaurants and 84 percent in occasion-type restaurants.

Of the total productive time, employees in all the restaurants studied spent approximately 27 percent of the working day in walking. This average represents the equivalent of more than seven people walking continuously. The variation between the restaurants studied for walking time of employees indicate that considerable savings are available through more efficiently designed restaurants. These data indicate the need for the development of more "self-

contained" work centers, which will provide the basis for more efficient work methods. The self-contained work centers should be designed to provide storage space for raw materials, equipment, and finished goods and should be located to provide for straight-line production flow. The impact of facilities design upon employee productivity was beyond the scope of this study. The better design features of some of the restaurants that participated in this study are illustrated.

The best equipment and proper planning and equipment layout will be of little value unless employees are properly motivated. Potential savings can be lost through employee turnover costs and poor work habits. Turnover cost could exceed \$12,600 a year in a firm with 31 employees and a turnover rate of 13 percent per month.

The average family-type restaurant that participated in this study had daily food sales of \$1,580, was open 20 hours a day for 7 days of the week, served 1,290 customers a day, realized \$0.38 income per square foot of floor area, and had a 32-percent payroll cost to sales ratio. The average occasion-type restaurant that participated in this study had daily food sales of \$1,564, was opened 10 hours a day for 7 days of the week, served 274 customers a day, realized \$0.32 income per square foot of floor area, and had a 29-percent payroll cost to sales ratio. Family-type restaurants realized \$0.06 greater income per square foot than occasion-type restaurants, which could indicate a greater return on capital investment. Employees in occasion-type restaurants received higher wages and had a 4-percent lower turnover than employees in family-type restaurants. Of the 13

participating restaurants, 11 were in the suburbs. Six of the participating restaurants were

one of a multiunit operation and the others were single-unit operations.

INTRODUCTION

During calendar year 1966, table service restaurant employees were paid wages of an estimated \$2,782 million. This expenditure will increase to an estimated \$5,050 million in 1971 as a result of rising wages and a dynamic, growing industry that requires 23,640 new employees each year. The restaurant industry is suffering from a shortage of qualified personnel.

This initial research was designed to evaluate the utilization of manpower in the production subsystem; to obtain related data on operating characteristics, facility layout, and operating methods; and to determine which components of the system require additional research. A meaningful productivity index had to be established to express the labor utilization in a restaurant. The majority of restaurant operators measure the effectiveness of their labor force by either the payroll ratio (payroll costs divided by gross sales) or sales per man-hour

ratio (gross sales divided by departmental man-hours). In this study the productivity index used was the number of man-hours by department to serve 100 customers. This index was used because it eliminated fluctuations in wage rates and menu prices. The method used to determine man-hours per 100 customers is presented in appendix exhibit A.

The data obtained in this study were obtained from the analysis of 13 restaurant operations. The participating restaurants were selected from varied geographic locations in the 48 contiguous States of the United States to assure wide representation. Each of the cooperators had a successful business operation and each operation was a typical family- or occasion-type restaurant. All data obtained and comments included in this report are for commercial business enterprises patronized by the public.

CHARACTERISTICS OF THE RESTAURANTS STUDIED

The basic operating characteristics of the 13 restaurants studied are described in this section of the report. In each of the 13 restaurants, food was well merchandised, of excellent quality, and served by appropriately dressed personnel in a pleasant dining atmosphere.

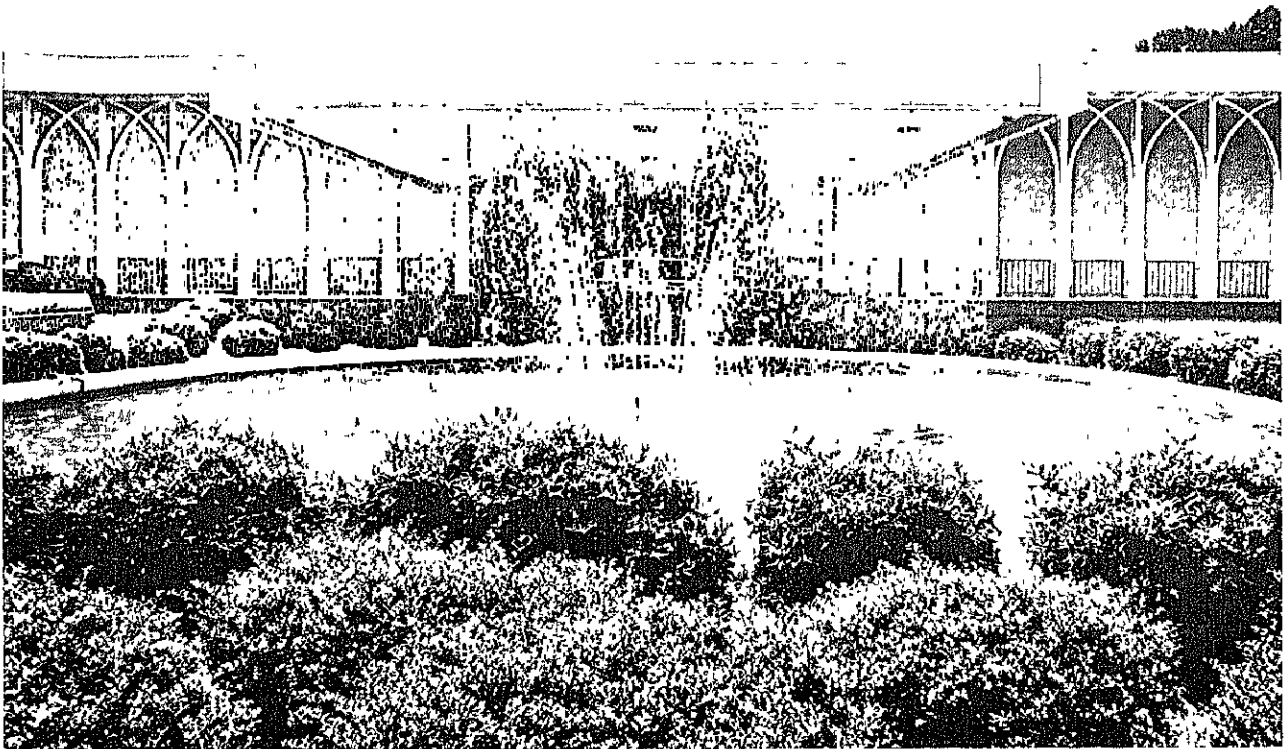
The table service restaurants that participated in this study were classified into two types, family and occasion. The occasion-type restaurant, as compared with the family-type restaurant, was generally larger in size (square feet of area) and had a greater seating capacity, higher check average, and lower seat turnover per day.

The primary difference in architectural design between the two types was the placement of more exterior windows in the family-type restaurant. The exterior of an occasion-type restaurant is shown in figure 1; exteriors of two typical family-type restaurants are shown in figures 2 and 3.

The interior of the occasion-type restaurant was characterized by a secluded dining area that was illuminated by artificial lighting. Typical patrons of occasion-type restaurants were those celebrating a birthday or anniversary, entertaining a business associate, or dining out for a special event. The table service usually consisted of linen napkins and tablecloths and centerpieces. The interiors of two occasion-type restaurants are shown in figures 4 and 5.

Typical patrons of the family-type restaurant were shoppers, students, office and retail store employees, and family groups. Table service usually consisted of disposable paper napkins and place mats. In some sectors of the country, family-type restaurants are defined as "coffee shops." The interior of a family-type restaurant is shown in figure 6.

Both types of restaurants studied offered a varied general menu to the public, in contrast to specialty restaurants such as a Chinese restaurant or a beef house.



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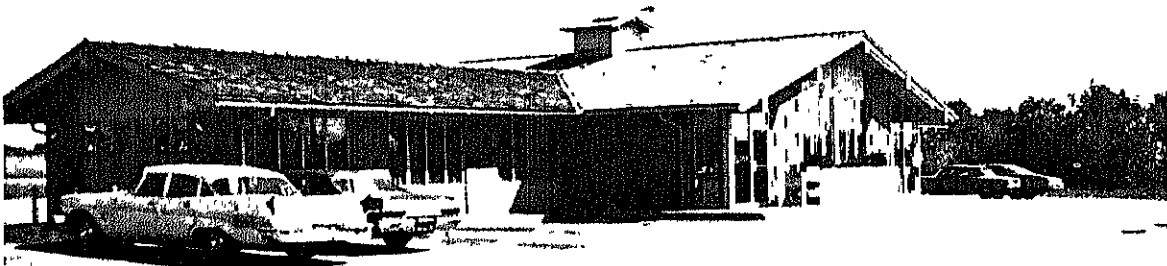
FIGURE 1.—Exterior of occasion-type restaurant.

Family-Type Restaurants

The basic operating statistics for the six family-type restaurants studied (A through F) are listed in table 1. Family-type restaurants A, D, E, and F were managed by a corporation and each was one of a multiunit operation. Restaurant B was a single-unit operation managed by a corporation. Restaurant C was one of a multiunit operation owned and operated by a sole proprietor.

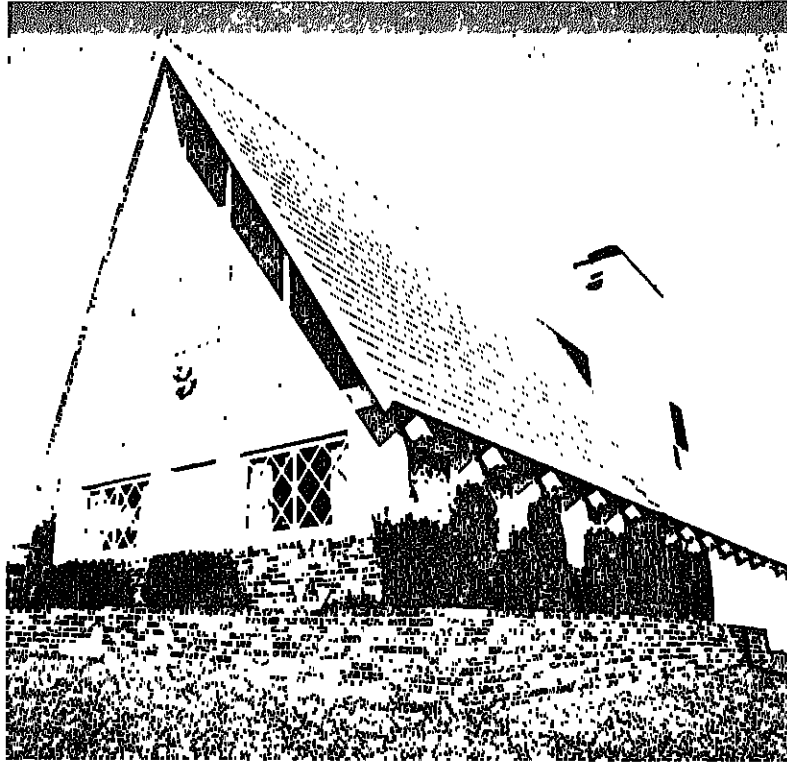
Employee recruitment and training was

handled by the management of each restaurant. Each of the family-type restaurants studied, with the exception of restaurant B, recruited employees having prior food service experience. The management of restaurant B found that its training program was more effective with inexperienced personnel as undesirable work habits had not been formed. Training usually was initial orientation concerning the job and then assignment to an experienced employee until proficiency in performing the various tasks had been achieved.



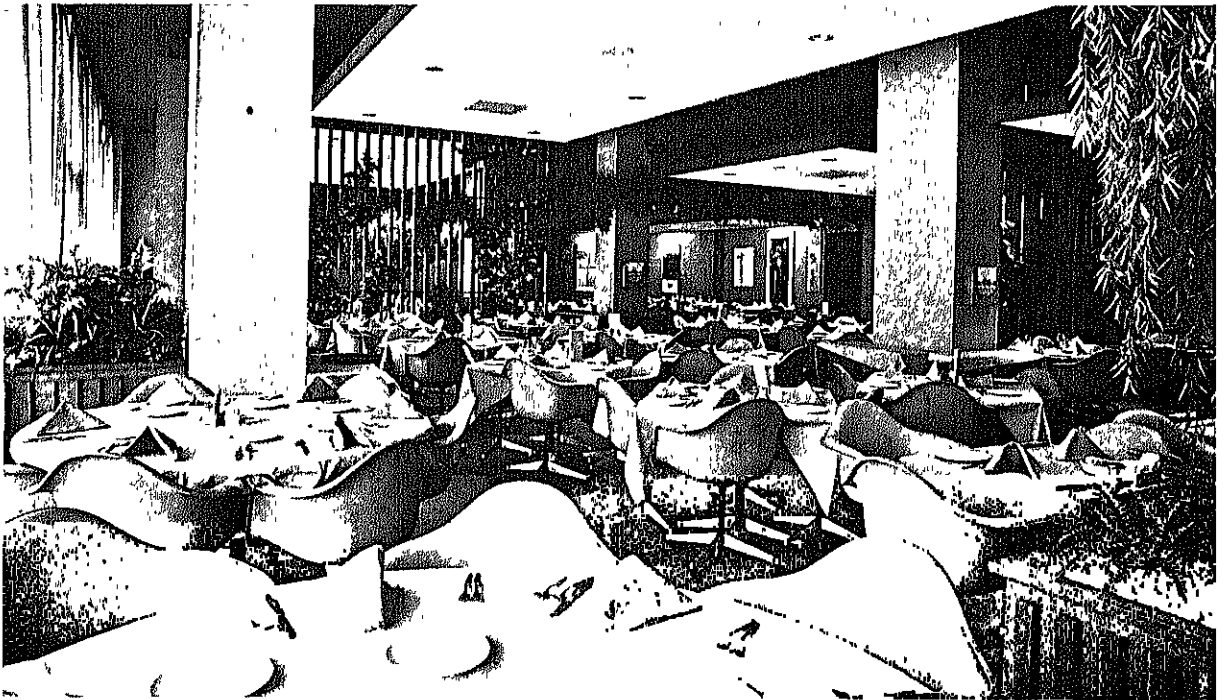
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FIGURE 2.—Exterior of family-type restaurant.



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FIGURE 3.—Exterior of family-type restaurant.



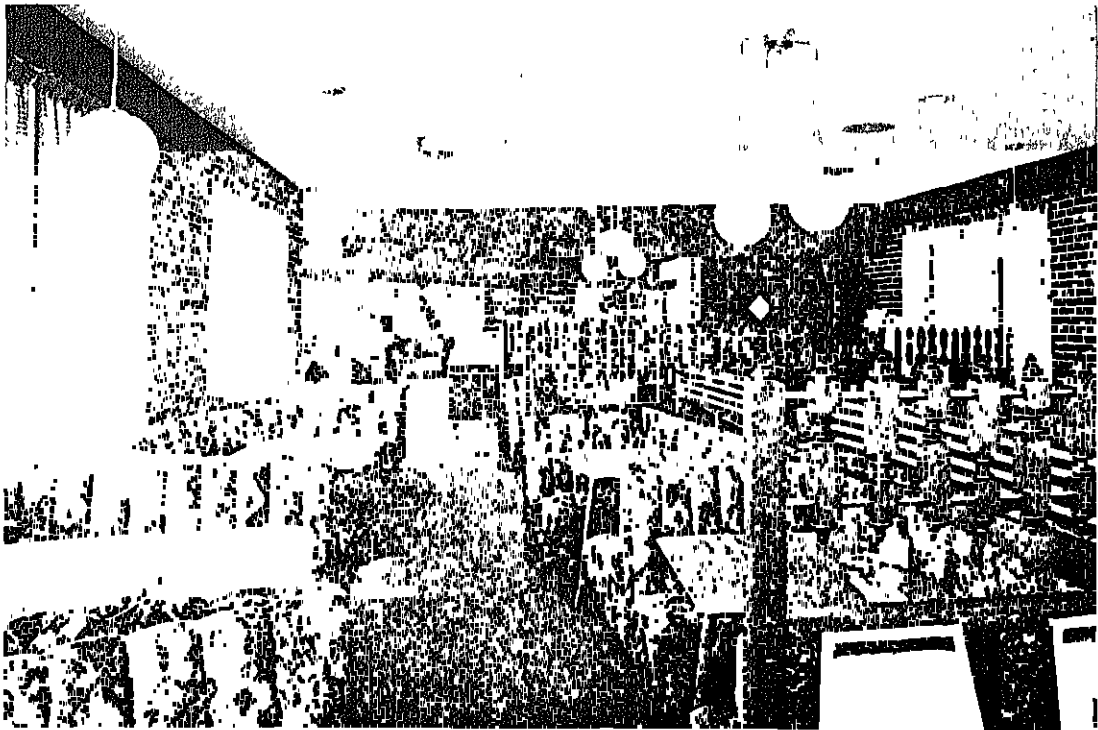
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FIGURE 4.—Interior of occasion-type restaurant.



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FIGURE 5.—Interior of occasion-type restaurant.



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FIGURE 6.—Interior of family-type restaurant.

TABLE 1.—Basic operating statistics of 6 family-type restaurants studied

Item	Restaurant					
	A	B	C	D	E	F
Annual sales -----	527,700	699,600	820,000	363,000	421,000	550,000
Daily sales: -----						
Food -----	1,184	1,943	2,072 ¹	1,267	1,318	1,696
Proportion of total sales -----	66.6	98.1	97.3	100.0	100.0	100.0
Liquor -----	594	37	57	--	--	--
Proportion of total sales -----	33.4	1.9	2.7	--	--	--
Total daily sales -----	1,778	1,980	2,129	1,267	1,318	1,696
Days per week open for business -----	6	7	7	7	7	7
Hours per day open for business -----	16.5	24.0	24.0	18.0	17.0	19.0
Type of meals served ² -----	B,L,D	B,L,D	B,L,D	B,L,D	B,L,D	B,L,D
Menu size: -----						
Luncheon entrees ³ -----	15	15	22	7	32	43
Nonrepetitive luncheon entrees ⁴ -----	5	3	5	0	14	7
Dinner entrees ³ -----	13	18	28	7	25	45
Nonrepetitive dinner entrees ⁴ -----	0	2	11	0	11	9
Dining areas -----	4	1	3	1	3	2
Dining decor ⁵ -----	M & C	M	M & C	M	C	C
Dining room seating -----	155	116	172	112	178	218
Daily customer count -----	929	1571	1503	1222	981	1,535
Seat turnover per day -----	6.0	13.5	8.7	10.9	5.5	7.0
Daily check average per customer ⁶ -----	1.91	1.26	1.42	1.04	1.34	1.10
Daily income per seat ⁶ -----	7.64	16.75	12.05	11.31	7.40	7.78
Daily income per square foot of dining area ⁶ -----	.19	.40	.32	.28	.12	.27
Daily income per square foot of kitchen area ⁶ -----	.08	.20	.15	.12	.11	.09
Total -----	.27	.50	.47	.40	.23	.36
Ratio of food cost to sales -----	34	35	36	37	36	34
Ratio of payroll cost to sales -----	35	30	33	37	29	27
Total -----	69	65	69	74	65	61
Average hourly rate -----	1.85	1.39	1.38	1.50	2.25	.92
Employee turnover per month -----	13	9	20	5	19	15

¹ With the exception of Sunday for 12 hours and Monday for 18 hours.² Letters indicate the following types of meals: B-Breakfast, L-lunch, D-dinner.³ Each beef, pork, lamb, fowl, fish, and seafood entree considered as one.⁴ Nonrepetitive entrees were changed daily.⁵ Letters indicate the following types of decor: C-contemporary, M-modern.⁶ Based on daily food sales.

Restaurant A has been in operation for 15 years in a shopping center with more than 100 retail stores in a city of over 600,000 population. This restaurant was remodeled and expanded approximately 5 years ago. Restaurant B was a unique operation in that two types of restaurant operations, a family and an occasion type, were located within the same 200-unit suburban motel. This restaurant has been in operation for more than 7 years in a city of over 800,000 population. Restaurant C has been in operation for 1 year in a 250-unit motel located in the main business district of a city of over 200,000 population. Restaurant D has been in operation for 2 years in a small suburban shopping center consisting of 17 stores in a city of over 100,000 population. Restaurant E was located in a small suburban shopping center of a city of over 1 million population and has been in operation for 8 years. Restaurant F was located in the downtown section of a city of over 600,000 population and has been in operation for 5 years.

Occasion-Type Restaurants

The basic operating statistics for the seven occasion-type restaurants studied (G through M) are listed in table 2. Restaurants G and M were each one of a multiunit operation. Restaurants H, I, J, K, and L were single-unit operations. Restaurants G, H, J, K, L, and M were each owned and managed by a corporation, and restaurant I by a partnership.

Employee recruitment and training was handled by the management of each restaurant. Each of the occasion-type restaurants studied, with the exception of restaurant J, recruited employees having prior food service experience. The management of restaurant J found that its training program was more effective with inexperienced personnel as undesirable work habits had not been formed. Training

usually was initial orientation concerning the job and then assignment to an experienced employee.

Table 3 shows the productive restaurant employee man-hours per 100 customers, the actual man-hours per 100 customers, and the performance index, by department, for family- and occasion-type restaurants. Productive time in man-hours per 100 customers, as compared with nonproductive time, is the time requirement for direct labor employees to perform such activities as preparing and cooking food, cleaning work stations, washing dishes, and other work associated with feeding the customers. Nonproductive time is the direct labor man-hours that do not contribute to the production of the finished product, such as the idle time of employees that results from lax supervision or failure to receive work assignments, or both. Lunch breaks and unavoidable delays are not included in nonproductive time. The data presented in table 3 should be of value as a guide and for making rough comparisons.

The average performance of employees in family-type restaurants (77.9 percent) was higher than that in occasion-type restaurants (73.9 percent), probably because of the greater supervisory attention received by employees in the smaller, family-type restaurants. The man-hours shown in table 3 are the averages for the family- and occasion-type restaurants studied. The man-hours for individual restaurants are shown in appendix tables 10 and 11.

As shown in table 4, the average restaurant in this study could reduce labor costs approximately \$29,400 annually by increasing labor performance to 95 percent through improved work scheduling and supervision. Additional reductions in operating costs could be made through more efficient kitchen equipment design and layout, better training of employees, and improved work methods.

MAN-HOUR REQUIREMENTS IN THE RESTAURANTS STUDIED

Productive man-hour requirements, when properly analyzed, provide the criteria for more perceptive and appropriate decisions involving the operations of a food service organization than the use of either the payroll ratio or the

sales per man-hour ratio. Man-hour measures provide management with; (1) accurate data as to the amount of time required by various groups of employees to produce meals for a specific business volume; (2) a performance

TABLE 2.—Basic operating statistics of 7 occasion-type restaurants studied

Item	Restaurant							Average
	G	H	I	J	K	L	M	
Annual sales ----- dollars -----	750,000	312,600	1,049,000	749,100	678,200	632,800	744,000	702,200
Daily sales:								
Food ----- do -----	1,061	1,386	2,386	1,051	1,549	1,969	1,548	1,564
Proportion of total sales ----- percent -----	76.2	80.0	69.0	64.0	78.0	79.0	70.0	73.5
Liquor ----- dollars -----	332	346	1,086	591	433	509	652	564
Proportion of total sales ----- percent -----	23.8	20.0	31.0	36.0	22.0	21.0	30.0	26.5
Total daily sales ----- dollars -----	1,393	1,732	3,472	1,642	1,982	2,478	2,200	2,128
Days per week open for business ----- number -----	7	6	6	7	7	7	6	7
Hours per day open for business ----- do -----	10.5	11.0	9.0	8.5	14.5	17.0	8.5	9.9
Type of meals served *	L,D	L,D	L,D	L,D	B,L,D	L,D	L,D	
Menu size:								
Luncheon entrees ⁴ ----- do -----	26	22	37	34	15		7	24
Nonrepetitive luncheon entrees ⁵ ----- do -----	7	0	0	1	0		0	1
Dinner entrees ⁴ ----- do -----	26	13	43	34	36	31	38	32
Nonrepetitive dinner entrees ⁵ ----- do -----	7	0	0	1	0	0	0	1
Dining areas ----- do -----	2	7	2	3	3	3	1	3
Dining decor ⁶ ----- do -----	E.A	T	C	C	C	C	T	
Dining room seating ----- do -----	253	324	199	339	235	363	208	274
Daily customer count ----- do -----	325	359	416	311	373	635	247	381
Seat turnover per day ----- do -----	1.3	1.1	2.1	.9	1.6	1.7	.9	1.4
Daily check average per customer ⁷ ----- dollars -----	4.29	4.82	8.35	5.28	5.31	6.83	8.91	6.26
Daily income per seat ⁷ ----- do -----	4.19	4.28	11.99	3.10	6.59	5.42	5.57	5.88
Daily income per square foot of dining area ⁷ ----- do -----	.18	.20	.32	.13	.23	.24	.19	.21
Daily income per square foot of kitchen area ⁷ ----- do -----	.11	.05	.19	.06	.17	.08	.08	.11
Total ----- do -----	.29	.25	.51	.19	.40	.32	.27	.32
Ratio of food cost to sales ----- percent -----	52	34	32	35	46	42	35	39
Ratio of payroll cost to sales ----- do -----	24	32	38	30	30	26	26	29
Total ----- do -----	76	66	70	65	76	68	61	68
Average hourly rate ----- dollars -----	1.77	1.40	2.84	1.39	1.78	1.25	1.55	1.71
Employee turnover per month ----- percent -----	2	2	3	9	20	16	11	9

¹ Open for lunch and dinner on Sunday for 12 hours.² Dinner only on Saturday for 6.5 hours.³ Letters indicate the following types of meals: B-breakfast, L-lunch, D-dinner.⁴ Each beef, pork, lamb, fowl, fish, and seafood entree considered as one.⁵ Nonrepetitive entrees were changed daily.⁶ Letters indicate the following types of decor: C-contemporary, T-traditional, E.A-Early American.⁷ Based on daily food sales.

TABLE 3.—*Productive and actual restaurant employee man-hours per 100 customers served in restaurants studied*

Department	Family-type restaurants			Occasion-type restaurants		
	Productive time per 100 customers ¹	Actual time per 100 customers	Performance index	Productive time per 100 customers ¹	Actual time per 100 customers	Performance index
	<i>Man-hours</i>	<i>Man-hours</i>	<i>Percent</i>	<i>Man-hours</i>	<i>Man-hours</i>	<i>Percent</i>
Meat and vegetable -----	2.98	3.85	77.4	10.53	13.89	75.8
Salad -----	1.15	1.44	79.9	4.00	5.23	76.5
Warewashing -----	2.65	3.47	76.4	8.86	11.75	75.4
Customer service -----	9.48	12.10	78.3	26.62	35.75	74.5
Bar -----	--	--	--	3.46	5.69	60.8
Total (or average) -----	16.26	20.86	77.9	53.47	72.31	73.9

¹ "Productive time per 100 customers" was developed from work sampling percentages, performance rating factors, and a personal and fatigue allowance to the "actual time per 100 customers."

TABLE 4.—*Projected savings available through improved work scheduling and supervision*

Restaurant	Existing				Projected	
	Actual time paid per day	Average hourly wage rate	Daily payroll cost	Performance index	Daily payroll cost at 95- percent performance	Annual savings ¹
Family-type:	<i>Man-hours</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Percent</i>	<i>Dollars</i>	<i>Dollars</i>
A -----	219	1.85	405	79.4	342	22,900
B -----	321	1.39	446	75.1	357	32,300
C -----	377	1.38	520	85.1	469	18,500
D -----	198	1.50	297	77.8	246	18,500
E -----	227	2.25	510	73.8	402	39,200
F -----	283	.92	261	75.4	210	18,500
Average -----	271	1.55	407	77.9	338	25,000
Occasion-type:						
G -----	172	1.77	304	76.4	248	20,500
H -----	227	1.40	318	79.1	267	18,500
I -----	342	2.84	971	78.2	808	59,200
J -----	254	1.39	353	70.0	265	31,900
K -----	224	1.78	394	70.6	298	34,800
L -----	319	1.25	398	76.0	322	27,600
M -----	286	1.55	443	70.7	335	39,200
Average -----	261	1.71	454	73.9	359	33,100
Average for family- and occasion-type restaurants -----	266	1.66	431	74.8	349	29,400

¹ Projected annual savings are based on 363 operating days per year and on the payroll costs at the time this study was made.

index that indicates the effectiveness of labor utilization; and (3) a means of evaluating the need for or the effect of methods improvement. The immediate value of establishing time requirements is effective labor utilization through better work scheduling.

The inception of "scientific management" in the United States is generally credited to Henry R. Towne. Towne presented his paper, "The Engineer as an Economist," in 1886 at a meeting of the American Society of Mechanical Engineers. In his presentation Towne states, in part:

"To insure the best results, the organization of productive labor must be directed and controlled by persons having not only good executive ability, and possessing the practical familiarity of a mechanic or an engineer with the goods produced and the processes employed, but having also, and equally, a practical knowledge of how to observe, record, analyze and compare essential facts in relation to wages, supplies, expense accounts, and all else that enters into or affects the economy of production and the cost of the product." As a result of this presentation, Frederick W. Taylor and Frank Gilbreth pioneered the development of labor productivity measurement.

The development of man-hour requirements and performance indexes will not, by itself, improve the operating efficiency and lower the operating costs in a food service establishment. Productivity data do, however, provide an excellent factual framework upon which work schedules can be developed and analyzed and methods improvements evaluated. It is important, therefore, that the reader have an understanding of the nature, applicability, and limitations of the man-hour requirements developed in this study.

The industrial engineering technique used in the development of productive man-hours in this study was work sampling. The work sampling technique is, in brief, the observation of employee activities at random times. A sufficient number of random observations yield a statistically reliable sample that has the same characteristics as continuous observation. A more detailed description of the methodology used is presented in appendix exhibit A.

Productive man-hours per 100 customers were developed for direct labor employees. Direct labor employees performed activities that were directly related to the production of a finished product for consumption by the restaurant customer. These activities were usually performed in specific locations within the restaurant, which, for purposes of this study, were defined as departments. The primary work tasks performed by direct labor employees in the meat and vegetable, salad, warewashing, customer service, and bar departments are described in appendix exhibit B, along with the primary tasks performed by indirect labor employees, such as managers, storeroom attendants, cashiers, housekeepers, and repairmen. A description of the observed activities of direct labor employees is shown in appendix exhibit C.

Observations of management, storeroom attendants, cashiers, and housekeeping employees were not recorded during the conduct of the work sampling study. Such factors as the nature of the activities performed, the frequency of occurrence, and the time available for conducting the study in each restaurant made this technique impractical. Some of the activities performed by managers and storeroom attendants, such as "telephone calls" and "planning," could not be accurately described as either productive or nonproductive on the random observation basis required by the work sampling process. The activities of housekeepers and cashiers were not recorded because a sufficient number of observations could not be obtained during the course of the study to obtain the 10-percent tolerance factor described in appendix exhibit A.

In the 13 participating restaurants, the man-hour requirements to provide service for 100 customers were developed for each department in family- and occasion-type restaurants. These man-hour requirements reflect the existing operating conditions for the specific restaurant operation under study. Differences in work methods, type and condition of kitchen equipment, layout and design of work areas, type of raw food ingredients purchased, and quality and quantity of finished goods produced are but a few of the variable factors that have a significant impact upon productive man-hours.

Proportion of Time Spent in Walking

The data developed during the conduct of this study have highlighted the important relationship between walking and labor productivity and the necessity of reducing unnecessary walking through methods improvement. Figure 7 indicates that the labor performance index decreases as the number of miles walked by employees increases.

The data presented in table 5 show that \$32,700, or 18 percent of the average annual payroll cost (\$182,960), is spent in walking in family-type restaurants and \$32,600, or 16 percent of the average annual payroll cost (\$208,290), is spent in walking in occasion-type restaurants. These costs point out the need for improved layout of food service facilities as the average employee spends more than 2 hours out of every 8 in walking an average of 6.5 miles.

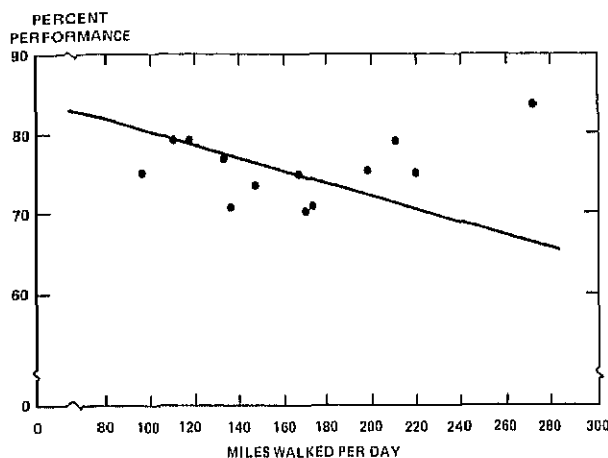


Figure 7 Trend of direct labor performance versus miles walked per day.

FIGURE 7.—Trend of performance index for direct labor versus miles walked per day.

TABLE 5.—Proportion of time spent and annual cost of walking in restaurants studied

Restaurant	Productive time spent walking, per 100 customers ¹	Average customer count per day	Time required for walking per day	Proportion of time spent walking	Distance walked per day	Annual cost ²
Family-type:	<i>Man-hours</i>	<i>Number</i>	<i>Man-hours</i>	<i>Percent</i>	<i>Miles</i>	<i>Dollars</i>
A -----	3.95	929	36.70	21.35	110.1	20,600
B -----	4.66	1,571	73.21	30.36	219.6	41,200
C -----	6.05	1,503	90.98	28.61	272.8	51,200
D -----	3.65	1,222	44.60	27.10	133.8	25,100
E -----	4.93	981	48.36	28.88	145.1	27,200
F -----	3.58	1,535	54.93	25.76	164.8	30,900
Average -----	4.47	1,290	53.12	27.01	174.4	32,700
Occasion-type:						
G -----	10.05	325	32.65	24.85	98.0	20,800
H -----	10.92	359	39.20	21.80	117.6	24,800
I -----	16.86	416	70.13	26.25	210.4	43,500
J -----	18.16	311	56.48	31.71	169.4	35,100
K -----	12.31	373	45.92	29.08	137.8	28,500
L -----	10.40	635	66.04	27.23	198.1	41,000
M -----	23.13	247	57.13	28.23	171.4	35,500
Average -----	14.55	381	52.51	27.03	157.5	32,600
Average for family- and occasion-type restaurants -----	--	--	55.10	27.02	165.3	32,700

¹ Productive time spent walking, per 100 customers, was developed by totaling the times shown in tables 10 and 11 for the activities, "Walking loaded" and "Walking empty," for all departments in each restaurant.

² Annual cost is based on 363 operating days per year and wage rates presented in tables 1 and 2.

Reliability of Data

Lower and upper tolerance estimates of productive man-hours per 100 customers for each department average are shown in tables 6 and 7 for family- and occasion-type restaurants. The lower and upper estimates were derived by application of the two-standard deviation formula. These estimates indicate the range of the individual observations around the averages. As a specific example, the average productive man-hours per 100 customers for the meat and vegetable department in family-type restaurants (table 6) is 2.98. Ninety-five times out of 100, the man-hours per 100 customers for an individual restaurant will vary from 1.36 to 4.60 from the average shown.

TABLE 6.—*Tolerance estimates of average productive man-hours per 100 customers for family-type restaurants studied*

Department	Average	Lower estimate ¹	Upper estimate ¹
	<i>Man-hours</i>	<i>Man-hours</i>	<i>Man-hours</i>
Meat and vegetable	2.98	1.36	4.60
Salad	1.15	.78	1.52
Warewashing	2.65	2.23	3.07
Customer service	9.48	7.42	11.54
Total	16.26	² 13.75	² 18.77

¹ Based on two-standard deviations.

² Not additive. Calculated deviation, based on total man-hours.

TABLE 7.—*Tolerance estimates of average productive man-hours per 100 customers for occasion-type restaurants studied*

Department	Average	Lower estimate ¹	Upper estimate ¹
	<i>Man-hours</i>	<i>Man-hours</i>	<i>Man-hours</i>
Meat and vegetable	10.53	7.09	13.97
Salad	4.00	2.53	5.67
Warewashing	8.86	5.10	12.62
Customer service	26.62	22.75	30.49
Bar	3.46	1.47	5.45
Total	53.47	² 40.69	² 66.25

¹ Based on two-standard deviations.

² Not additive. Calculated deviation, based on total man-hours.

The upper and lower deviation estimates of the averages shown are rather wide for two reasons. First, such variable factors as employee training, type and placement of equipment, and work methods have a significant impact upon productivity. A quantitative analysis of these variable factors was beyond the scope of this study and, therefore, such statistical techniques as regression and correlation analyses were not utilized. Second, the relatively high deviation estimates may be the result of using a limited number of restaurants in the mathematical calculation to derive these data.

PROCEDURE FOR USING PRODUCTIVE MAN-HOURS

The average productive man-hours per 100 customers, which have been developed in this study, can be used to compare the productivity of your restaurant with the productivity of the restaurants that participated in this study. In making your comparison, you should give utmost consideration to the following factors:

(1) Identical table service restaurants are virtually nonexistent. Such variables as the number and volume of specific menu items produced, menu production methods, type and arrangement of equipment, and levels of employee training have a significant impact upon the direct labor requirements for a specific operation.

(2) The accuracy of the average productive man-hours (as indicated in the foregoing section) limits the use of these data.

(3) The restaurants that participated in this study were not randomly selected. Restaurants were selected on the basis of geographic location, profitability, and conformity to either a family- or occasion-type restaurant. The limited sample of 13 selected restaurants are not representative of all family- and occasion-type restaurants. Nevertheless, the data developed in this study will provide the knowledgeable operator with an initial tool to increase employees' productive time.

For purposes of illustration, the man-hour requirements of 200-seat, occasion-type restaurants with annual sales in excess of \$700,000

TABLE 8.—*Example of productive man-hours required per day for an occasion-type restaurant studied*

Department	(1) Productive time per 100 customers	(2) Number of customers per day divided by 100	(3) Productive time per day (1) x (2)	(4) Actual time per day	(5) Perform- ance (3) ÷ (4) x 100
	Man-hours	Number	Man-hours	Man-hours	Percent
Meat and vegetable --	10.53	2.45	25.8	32.0	80.6
Salad -----	4.00	2.45	9.8	16.0	61.3
Warewashing -----	8.86	2.45	21.7	38.0	57.1
Customer service ---	26.62	2.45	65.2	96.0	67.9
Bar -----	3.46	2.45	8.5	16.0	52.3
Total -----	---	---	131.0	198.0	¹ 66.2

¹ Not additive. Calculated by dividing column 3 by column 4 and multiplying the result by 100.

are calculated. The results of these calculations are shown in table 8. This restaurant is located in the suburbs and has a food-cost ratio of 35 percent and a payroll-cost ratio of 27 percent. The majority of customers are accommodated on a reservation basis.

The productive man-hours per 100 customers for each department of an occasion-type restaurant are recorded in column (1). A summary of one day's sales from the cashier reveals that 245 customers were served. The customer count, 245, is divided by 100 ($245 \div 100$); the result, 2.45, is recorded in column (2). The figure 2.45 is repeated in column (2) for each department for convenience in calculation only. The productive man-hours per 100 customers in column (1) are multiplied by the number of hundreds of customers per day in column (2) to derive the productive man-hours per day in column (3). The number of payroll hours is summarized from timecards, according to the department categories shown, and recorded in column (4), actual man-hours per day.

The productive time per day (column 3) is divided by the actual time per day (column 4); the result is then multiplied by 100 for performance (column 5).

Table 8 indicates that the overall performance for the direct labor departments is 66.2 percent. The salad department with a 61.3-percent performance, the warewashing depart-

ment with a 57.1-percent performance, the customer service department with a 67.9-percent performance, and the bar department with 52.3-percent performance, all have a substantial impact on the overall performance. Any department with less than 75-percent performance should be analyzed in an effort to increase its productivity. The owner, manager, or authorized persons should review the operating practices in these departments and improve these practices.

Comparing Your Operation With the Study Averages

You should use the following procedure to compare the man-hours of your operation with the study averages:

(1) Record on columnar paper, the headings that are shown on table 8.

(2) List, under the head "Department," the departments for your own operation. (A description of table service restaurant departments by type of work performed is presented in appendix exhibit B.)

(3) List the productive time per 100 customers for each department in column (1). (The productive time for family- and occasion-type restaurants is shown in table 8.)

(4) Obtain the customer count for a typical day's operation, divide by 100, and record the result in column (2).

(5) Multiply the data in column (1) by the data in column (2), for each department, and record the results in column (3).

(6) Summarize the payroll hours, by department, for the typical day's operation, and record in column (4).

(7) Divide the data in column (3) by the data in column (4), for each department, multiply the figure obtained by 100, and record the results in column (5).

Scheduling Employees

Careful scheduling of employees to match work requirements is one of the most effective methods for reducing labor costs. To develop an effective schedule, the operator must first develop time standards for the performance of specific production tasks. When operating management is provided with this tool, weekly work schedules can be developed for each employee by department, based upon estimated production requirements for the period.

The operators who participated in this study indicated that they seldom required one full man-day (8 man-hours) or a whole multiple thereof (16, 24, 32) to meet production requirements in specific departments.

Thus, employees having less than a full 8 hour workload in one department should be interchangeable to another. This anticipated job combination should be indicated on the schedules. To develop and maintain this scheduling flexibility, the operator must train employees in more than one job.

The schedule for a salad department is illustrated in figure 8. This schedule indicates that the two salad department employees, Ada Smith and Tom Riley, should both report to work on Sunday at the times indicated. The digits 4.5/W-3.5/8.0 beneath Tom Riley's reporting time indicate where and how long he will work. The first part of the series, 4.5, indicates that he should work 4.5 hours in the salad department. The second part of the series, W-3.5, indicates he should work 3.5 hours in warewashing, and the third part of the series, 8.0 indicates the total hours he should work on this shift. Management should inform employees of the time of day when these transfers are to be made. The addition of the first part of the series

DEPARTMENT Salad

For the week ending _____ 19 ____

EMPLOYEE NAME		SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
No.	Name							
112	Ada Smith	10 00 6:00 8 0/0/8.0						
102	Tom Riley	1.00- 9.00 4 5/W-3.5/8.0						

Figure 8. Weekly employee work schedule by department.

FIGURE 8.—Weekly employee work schedule by department.

of digits for all employees on the department schedule will indicate the total hours scheduled

in the department; in this example, 12.5 man-hours ($8.0 + 4.5$).

FACILITIES DESIGN AND METHODS

The layout and design of a table service restaurant has a significant impact upon the operating efficiency of the production system. A good design based upon realistic production estimates will reduce labor requirements, eliminate processing "bottlenecks," and minimize maintenance costs.

An operator can obtain assistance from qualified kitchen engineers, consulting firms, engineering firms, and kitchen equipment contractors in the construction of a new restaurant or the remodeling of an existing facility. Before entering into an agreement with one of the foregoing on the construction of a new restaurant or a major remodeling job, the operator should obtain a feasibility study and become knowledgeable in the fundamentals of good design.¹ The feasibility study, if well designed and executed, will provide answers to the following questions: What is the market potential for my specific operation? Where should it be located? How large should the operation be? What are the projected costs and profits? Should the project be undertaken?

Preliminary Design

After a reputable authority determines that the proposed facility is economically feasible,

the space required for the restaurant can be developed. The volume projections developed in the feasibility study should be used to determine the productive capacity required. Management should then determine the production methods to be used in processing the menu items, after which the kitchen designer can develop equipment specifications and space requirements to meet the projected production volume. Table 9 shows the average areas in square feet, by functions, for the restaurants that participated in this study. Appendix tables 12 and 13 show the areas, by function, for each of the participating restaurants. These averages are presented for guideline purposes only because menu variety and volume, production methods, and equipment used have a significant impact upon space requirements.

Figure 9 illustrates the material or workflow in the production subsystem. This descriptive model indicates that workflow should be kept in a straight line, as used in assembly line production, to minimize backtracking, delays, and material handling costs. In actual practice, the physical layout often must be circular, U-shaped, L-shaped, or parallel because of the constraints imposed by property boundaries and building design.

Planning criteria developed in the course of this study, which might be helpful in designing a restaurant, are as follows:

- (1) Planning should be directed toward reducing employee travel distances.
- (2) About 40 percent of the total area was devoted to dining.
- (3) The average dining room provided 15 square feet of area per seat.
- (4) Three percent of the total restaurant area was required for the customer lounge.
- (5) Three percent of the space was required for the waiter's station in the kitchen.
- (6) Three percent of the space was required for the dishroom and for washing pots and pans.
- (7) About 6 percent of the space was required for the meat and vegetable cooking and preparation departments.

¹ Additional sources of information:

BANGS, O. E., JAHN, E. A., SCHNEIDER, N. F., and SMITH, A. Q. *COMMERCIAL KITCHENS*. 288 pp., illus. American Gas Assoc., New York. 1962.

BIEDERMAN, K., WILHEMY, O., JR., DULL, J. R., and BOUMA, J. C. *LAYOUT, EQUIPMENT, AND WORK METHODS FOR SCHOOL LUNCH KITCHENS AND SERVING LINES*. U.S. Dept. Agr. Mkt. Res. Rpt. 753, 45 pp., illus. 1966.

DANA, A. W. *KITCHEN PLANNING FOR QUALITY FOOD SERVICE*. 229 pp., illus. Harper and Bros., New York. 1949.

HOFF, M. H. *PLANNING FOR PROFIT*. *Cooking for Profit Magazine*. 15 pp., illus. Gas Magazines Inc., Madison, Wis. 1968.

KOTSCHIEVAR, L. H., and TERRELL, M. E. *FOOD SERVICE PLANNING-LAYOUT AND EQUIPMENT*. 449 pp., illus. John Wiley and Sons, New York. 1961.

VOLUME FEEDING MAGAZINE. *PLAN AND DESIGN SYSTEMS*. February edition, pp. 23-46, illus. Conover Mast Publications, New York. 1967.

TABLE 9.—Average areas and percentages of total areas, by function, for 13 restaurants studied

Area description	Family-type restaurant			Occasion-type restaurant		
	Average area	Percentage of total area	Area per seat ¹	Average area	Percentage of total area	Area per seat ¹
Seating area:	<i>Sq. ft.</i>		<i>Sq. ft.</i>	<i>Sq. ft.</i>		<i>Sq. ft.</i>
Dining room -----	2,827	33.2	17.8	3,469	29.6	12.7
Cocktail lounge -----	420	4.9	10.2	877	7.5	17.2
Bar -----	304	3.6	23.4	310	2.7	16.3
Total, seating area -----	3,551	41.7	--	4,656	39.8	--
Kitchen area:						
Meat and vegetable cooking ---	393	4.6	2.5	355	3.0	1.3
Meat and vegetable preparation	287	3.4	1.8	298	2.5	1.1
Salad preparation -----	137	1.6	.9	190	1.6	.7
Pot and pan washing -----	86	1.0	.5	62	.5	.2
Dishroom -----	224	2.6	1.4	318	2.7	1.2
Waiter pickup -----	191	2.2	1.2	337	2.9	1.2
Bakery -----	332	3.9	2.1	396	3.5	1.4
Total, kitchen area -----	1,650	19.3	10.4	1,956	16.7	7.1
Storage area:						
Walk-in cooler -----	179	2.1	1.1	271	2.3	1.0
Walk-in freezer -----	69	.8	.4	102	.9	.4
Storeroom -----	431	5.0	2.7	601	5.1	2.2
Liquor storage -----	136	1.6	.9	342	2.9	1.2
Miscellaneous storage -----	110	1.3	.7	401	3.5	1.5
Total, storage area -----	925	10.8	5.8	1,717	14.7	6.3
Other areas:						
Customer lounge -----	240	2.8	1.5	373	3.2	1.4
Public restrooms -----	291	3.4	1.8	270	2.3	1.0
Checkroom -----	55	.6	.4	95	.8	.3
Cashier -----	54	.6	.4	34	.3	.1
Waiter stations -----	109	1.3	.7	102	.9	.4
Employee lockers and restrooms	324	3.8	2.0	311	2.7	1.1
Employee dining -----	66	.8	.4	77	.7	.3
Equipment room -----	257	3.0	1.6	363	3.1	1.3
Office -----	94	1.1	.6	255	2.2	.9
Miscellaneous -----	919	10.8	5.8	1,486	12.6	5.5
Total, other areas -----	2,409	28.2	15.2	3,366	28.8	12.3
Total, all areas -----	8,535	100.0	--	11,695	100.0	--
Capacity:	Number of seats			Number of seats		
Dining room -----	159			274		
Cocktail lounge -----	41			51		
Bar -----	14			19		

¹ Area per seat is based on the average dining room seating, with the exception of cocktail lounge and bar.

The layout plans will show the overall building design and the location and relationship of departmental production areas that establish the major employee traffic patterns. The study shows that the planning goal should be to locate

the two major departments—the meat and vegetable department and the salad department—directly behind the waiter's pickup counter. If not, undesirable cross traffic results.

The interior decor and atmosphere of the din-

ing area should enhance dining pleasure. A professional designer can often develop the operator's ideas as the basis for decor of the dining area. The architect or consultant may also have suggestions concerning interior design and is often able to recommend experienced

decorators. In designing the dining area, the operator should provide space in the waiter's station for condiments, water, ice, and glasses.

The following criteria should be considered with respect to kitchen design.

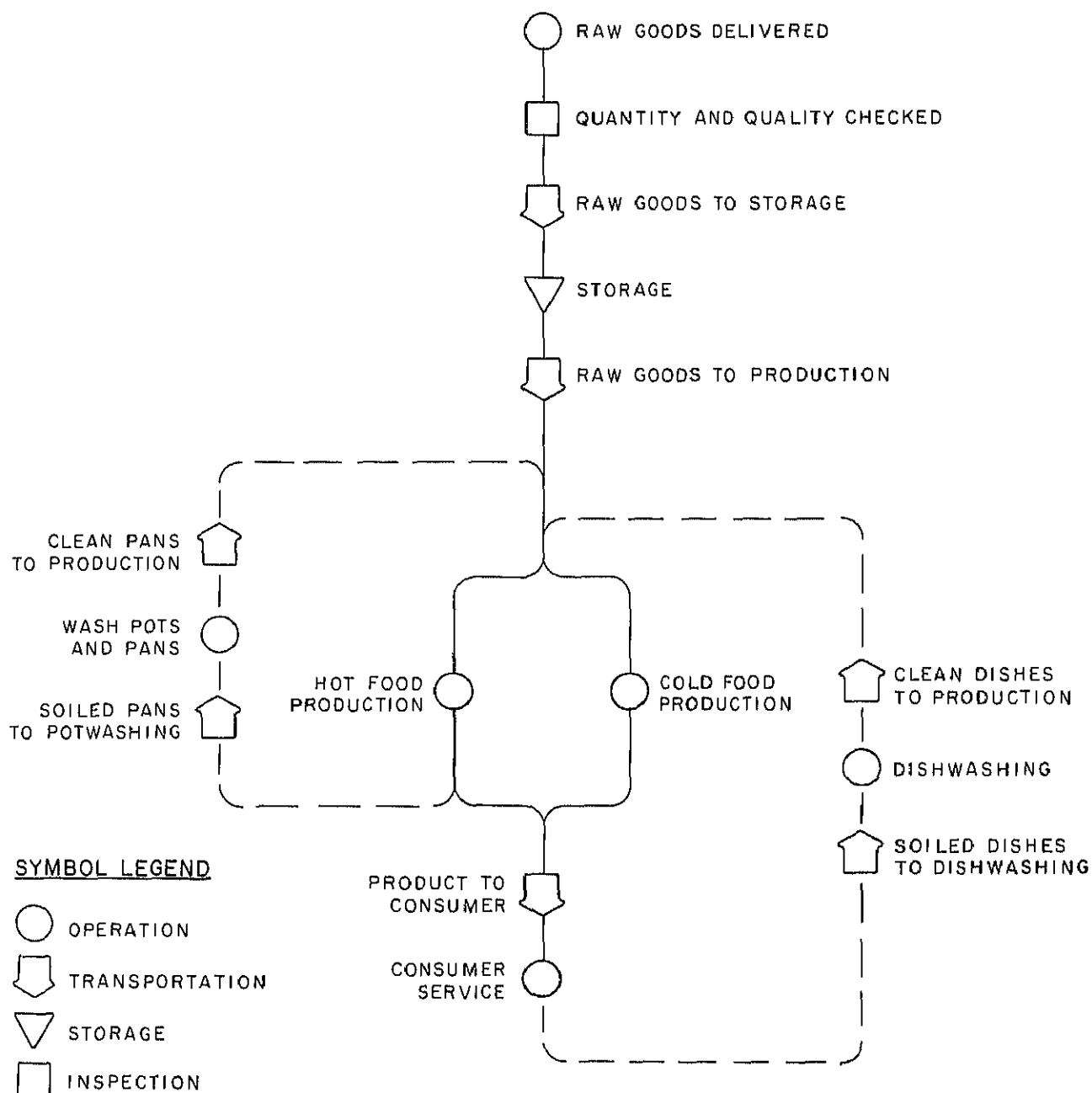


FIGURE 9.—Workflow in the production subsystem.

(1) The kitchen should have proper lighting and air temperature control. These factors are most important to the attainment of high worker productivity.

(2) Floors and walls should be of nonporous material for ease in cleaning.

(3) Drains of adequate number and size should be provided for proper cleaning of floors.

(4) Nonskid materials should be applied to the floor in main traffic aisles to minimize accidents when floors are wet.

(5) Range hoods should be of stainless steel for easy cleaning.

(6) Grease filters on hoods should be easily removed for proper cleaning.

(7) All equipment should be installed to facilitate cleaning and maintenance. If possible, equipment should be installed so that food cannot fall under or behind it. If such installation isn't possible, there should be adequate space for removal of dropped or spilled food.

(8) Walk-in refrigerated units should have mobile racks to facilitate the movement of goods when cleaning.

Occasion-Type Restaurants

A modified layout of one of the occasion-type restaurants that participated in this study is shown in figure 10. The product flow is indicated by the lines connecting the storage and production symbols. Raw materials are delivered at the employee and receiving entrance. Materials are checked against the invoices and then are moved into either the storerooms (items 1 and 2) or the walk-in coolers (items 3 and 4) or the walk-in freezer (item 5). This layout facilitates straight-line production, as raw material moves directly from the storage areas, through the preparation and cooking work centers (items 6 and 7, or 9), and into the dining room (item 11). Finished production leaving the kitchen is audited against the guest check at the checker-cashier's station (item 10). The waiter's station (item 16) is centrally located in the dining room to reduce travel requirements. Soiled dishes are transported to the dishroom (item 12) for processing. The clean dishes are then stored in the salad preparation work center, the meat and vegetable cooking work center, and the dining room. Soiled pots and pans flow from the meat and vegetable cooking work center (item 7) to the adjacent pot and pan washing work center (item 8), and then back to the meat and vegetable cooking work center. This design mini-

mizes backtracking and cross-traffic conditions.

Employee dining facilities (item 13) are located between the dishroom and the storeroom. The partition between the dishroom and the employee dining facilities contains picture windows. The location of employee dining facilities in the kitchen enables management to control meal periods and coffee breaks more closely. Space for approximately four 30- by 30-inch tables and 16 chairs is provided in this area.

Employee lockers and restroom facilities are located in the basement, along with management offices, the equipment room, and miscellaneous storage space. Each employee should be provided with a combination lock and a locker or storage compartment for personal clothing and valuables. Combination locks were generally preferred by both management and employees because the need for keys and related replacement expenses were eliminated. Lockers should be secured to a wall or back to back to eliminate the hazard of toppling. The installation of false fronts between the ceilings and tops of lockers eliminates the storage of soiled linen and clothing on locker tops.

The chef's office (item 15) is so located that an overall view of the production work centers is provided through picture windows in the partition between the office and the production work centers. The floor level of the office is approximately 3 feet above that of the kitchen.

The janitor's closet (item 14) is adjacent to the chef's office.

The customers enter the dining room (item 11) or the cocktail lounge (item 19) from the customer lounge (item 20). The reservation station (item 22) is located in the customer lounge. This station should be equipped with an "intercom" telephone system to the dining room to enable the receptionist at the station to determine table availability for waiting customers. The customer checkroom (item 21) should be adjacent to the reservation station. Coats, wraps, and similar wearing apparel should be checked and controlled by the employee at the reservation station. This arrangement eliminates the need for customers to carry valuable personal property into the cocktail lounge and dining room.

Customer restrooms (items 17 and 18) are

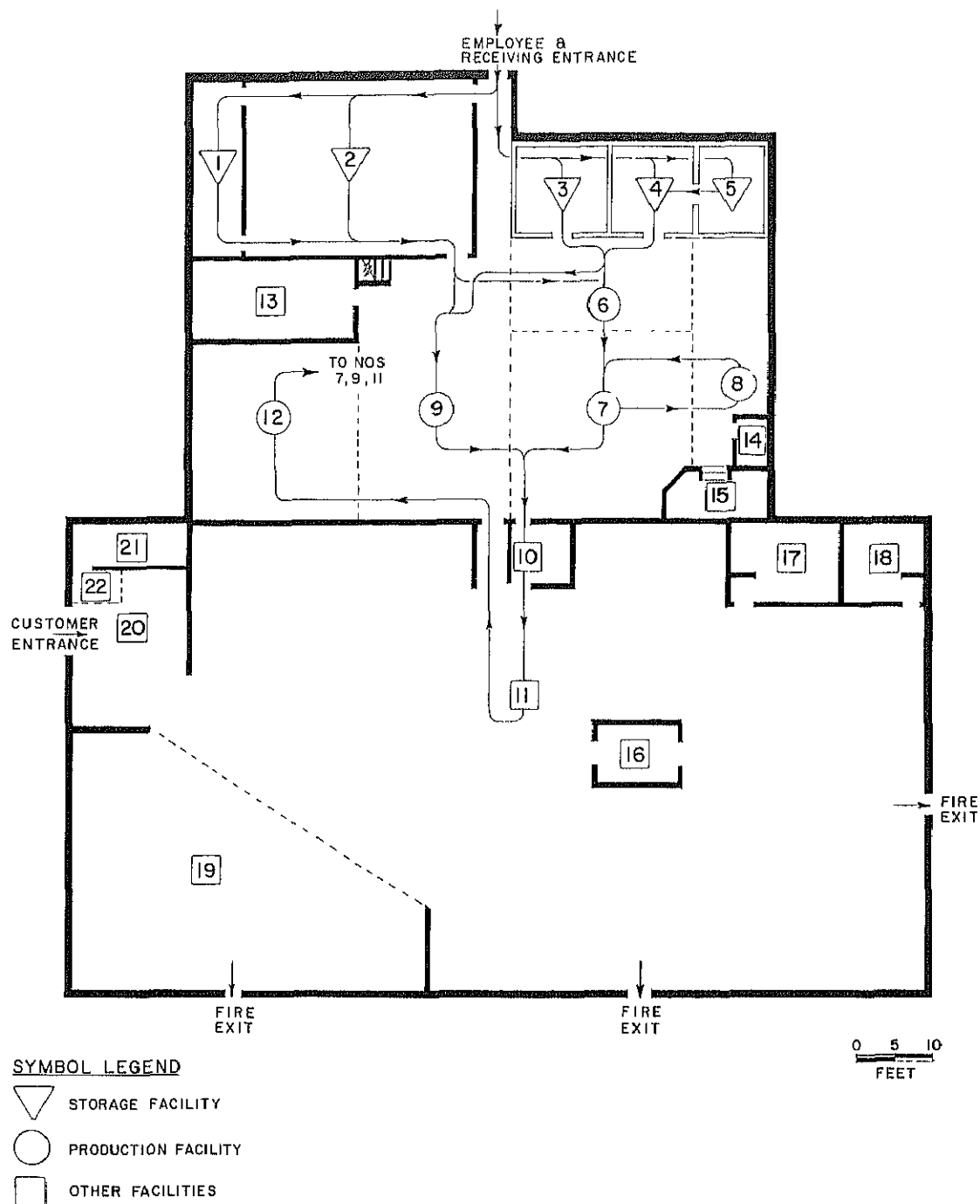


FIGURE 10.—Layout for occasion-type restaurant.

Facility legend

- | | | |
|---------------------------------------|-------------------------------|-------------------------|
| 1. Liquor storage | 7. Meat and vegetable cooking | 15. Chef's office |
| 2. Storeroom | 8. Pot and pan washing | 16. Waiter's station |
| 3. Dairy and vegetable walk-in cooler | 9. Salad preparation | 17. Women's restroom |
| 4. Meat walk-in cooler | 10. Checker-cashier's station | 18. Men's restroom |
| 5. Walk-in freezer | 11. Dining room | 19. Cocktail lounge |
| 6. Meat and vegetable preparation | 12. Dishroom | 20. Customer lounge |
| | 13. Employee dining | 21. Checkroom |
| | 14. Janitor's closet | 22. Reservation station |

located at the rear of the dining room. This location reduces the possibility of customer exit without check payment.

Storage facilities layout

Figure 11 shows the layout for receiving, storage, and employee dining areas. The receiving dock (item 1) should be 40 inches above the driveway or street level. This height will minimize the lifting requirements from the truck bed to the dock and reduce unloading time. Dock bumpers (item 2) constructed of 2- by 8-inch oak or other suitable material should be mounted on the edge of the dock to prevent damage from "backing" delivery trucks. A trash storage area (item 3) is provided for scrap-can storage of glass bottles, boxes, and similar waste. The dock floor should slope away from the building (approximately 1-inch drop per foot) to provide for proper drainage. Most restaurants that participated in this study did not have canopies over the receiving area. In the event a canopy or roof is desired, the leading edge should be 15 feet above the street or driveway level.

Walls and floors of the storerooms and of the food preparation and cooking work centers were similar. Walls were faced with white tile or similar nonporous material. Floors were generally constructed to pitch to a centrally located floor drain and were covered with red tile. Shelving was set out at least 2 inches from walls. This type of construction and shelving location facilitated housekeeping.

Temperature of dry storage rooms should be maintained between 60° and 70° F., and provisions should be made for adequate ventilation. Such factors as subsoil dampness and dripping or sweating walls and pipes should be guarded against to avoid product damage. Lights that provide more than 20 foot-candles will enable employees to read labels without difficulty and will eliminate glare.

The storeroom (item 4) and liquor storage (item 5) shown in figure 11 are provided with 24-inch-wide storage shelves (item 6). Commercial shelving is available in 12-, 18-, and 24-inch widths.

Figure 12 shows the use of stainless steel shelving in a storeroom. The use of adjustable-height, 24-inch shelving is ideally suited for

the storage of No. 2, No. 2½, No. 3, and No. 10 cans. Two rows of 12-inch-wide shelving have been provided at the front of the storeroom for condiments, spices, and similar items requiring less shelf area. The top shelf should be no more than 6 feet above the floor so items can be reached without the use of a stepladder. The bottom shelf should be high enough above the floor to allow for easy cleaning. Food products should not be stored on the floor because they may be damaged by moisture. The most frequently issued items (fast movers) should be located in the front of the storeroom near the issue window; slower moving items should be located toward the rear of the storeroom or on top shelves. Aisleways should be at least 30 inches wide so that the storeroom attendant can transport cases with a two-wheel handtruck.

A mobile platform scale with a 400-pound capacity (item 7 in figure 11) is located at the rear door, adjacent to the receiving dock. The scale may be wheeled into the hallway or onto the receiving dock to weigh cased meat products or other products that will be moved into refrigerated storage. An order desk (item 9) and telephone (item 10) are provided to facilitate reordering of stock by the storeroom attendant.

The employees enter the restaurant through the receiving door. Clean uniforms are stocked in reach-through uniform lockers (item 8) by the storeroom attendant. These lockers enable employees to pick up clean uniforms and return soiled uniforms at any time of the day without requiring services of the storeroom attendant. The timeclock (item 16) and the "in" and "out" timecard racks (item 17) are located adjacent to the stairwell leading to employee facilities in the basement. A bulletin board (item 18) is located on the stairwell partition for posting employee schedules and management notices.

The exterior and interior walls of walk-in coolers should be faced with aluminum, stainless steel, or white nonporous material such as that shown in figure 13. These materials greatly reduce cleaning time. Illumination in excess of 20 foot-candles should be provided. Incandescent lamps should be protected by moisture-resistant glass shields to prolong lamp life and reduce corrosion in lamp sockets. Lamps should be controlled by exterior switches provided with

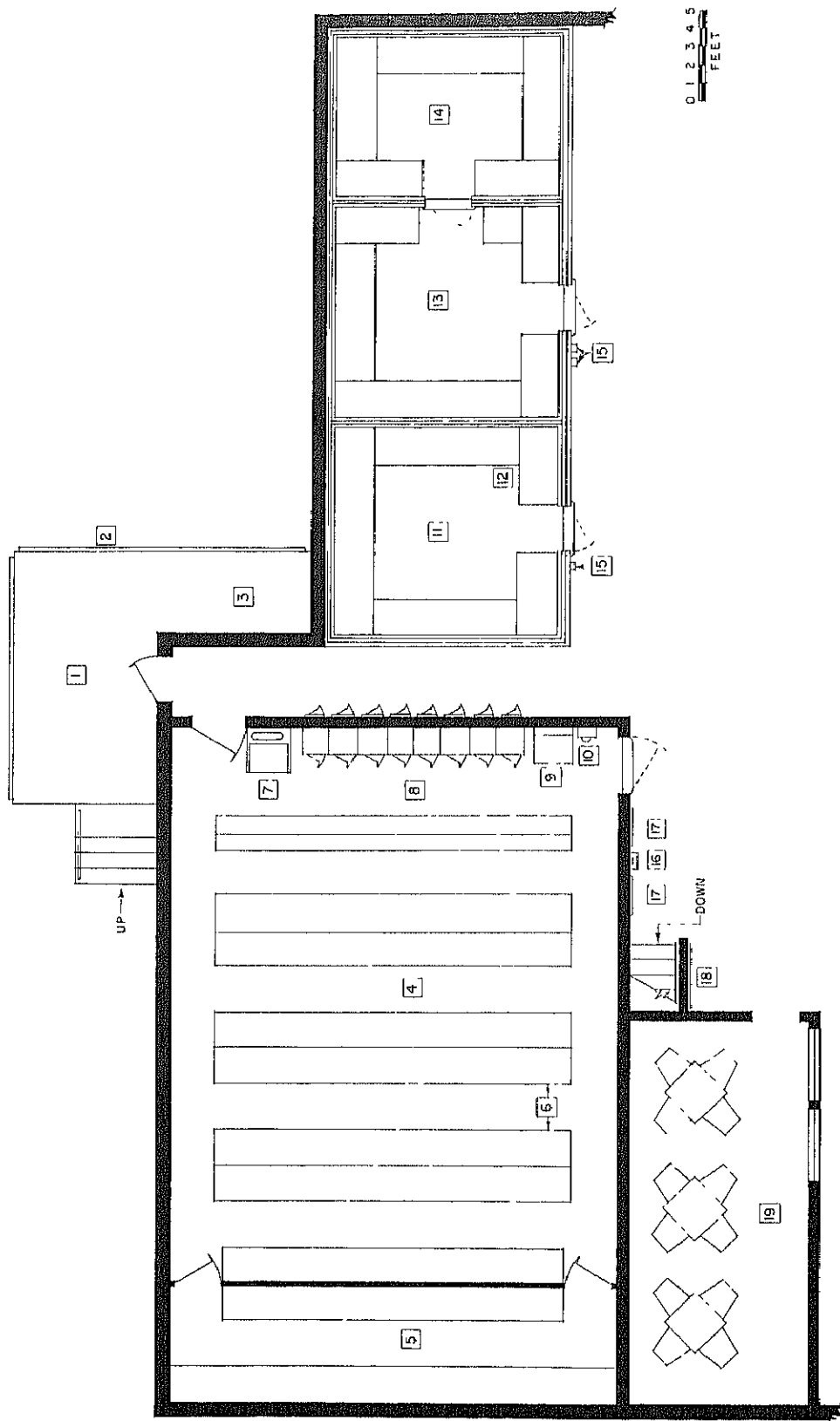


FIGURE 11.—Layout for receiving, storage, and employee dining areas.

Equipment schedule

1. Receiving dock
2. Dock bumper
3. Trash storage
4. Storeroom
5. Liquor storage
6. Shelving (11)

7. Platform scale
8. Reach-through uniform lockers
9. Order desk
10. Wall telephone
11. Dairy and vegetable walk-in cooler
12. Mobile cooler racks (16)

13. Meat walk-in cooler
14. Walk-in freezer
15. Exterior temperature gages (3)
16. Timeclock
17. Timecard racks (2)
18. Bulletin board
19. Employee dining

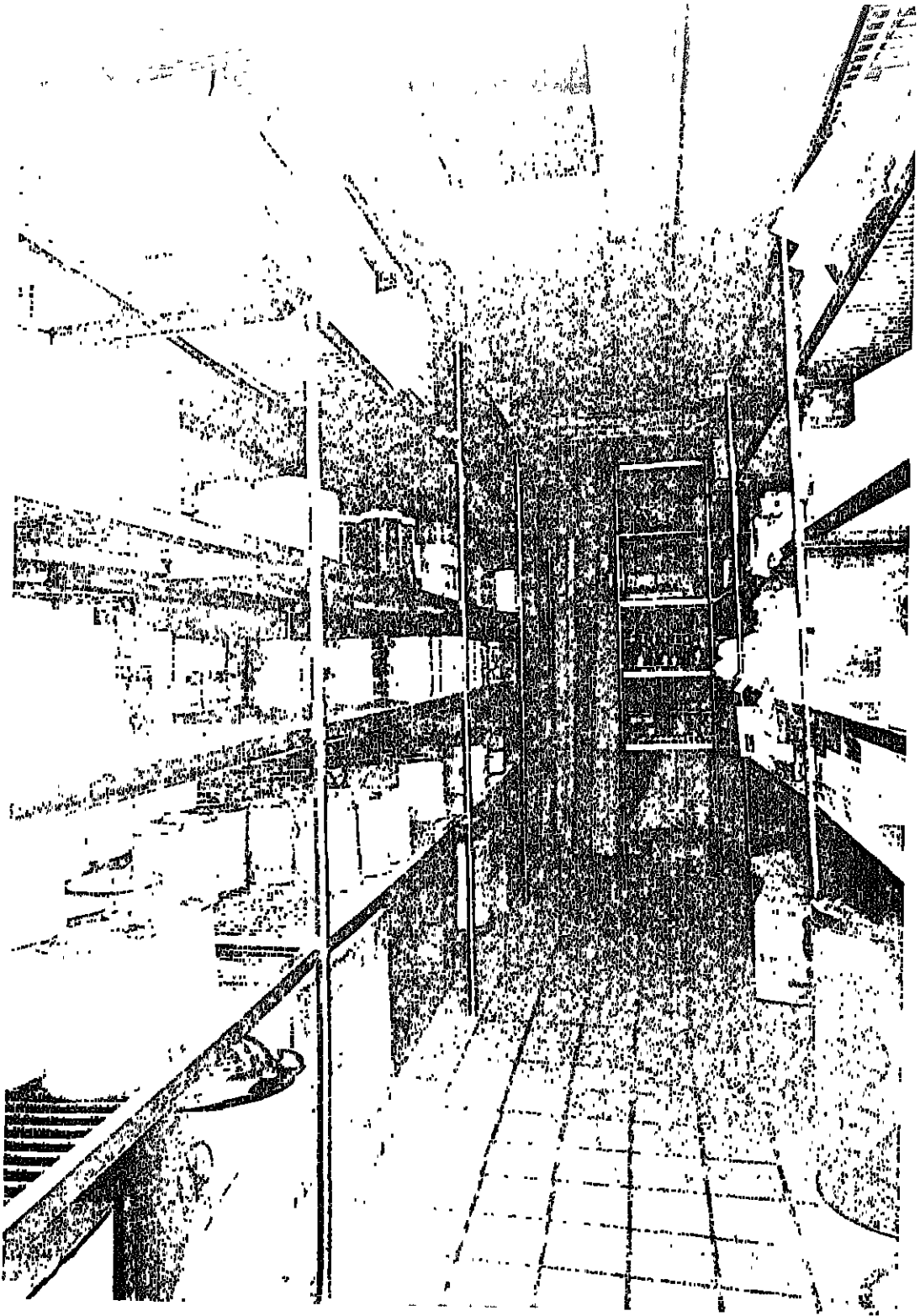


FIGURE 12.—Storeroom.

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FIGURE 13.—Interior of walk-in cooler.

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indicator lamps. Where sanitation codes permit, the tile floor should be pitched to a centrally located interior floor drain. In communities where sanitation codes prohibit interior drains, floors should be sloped toward the door, and the drains should be in an adjacent, exterior aisleway. Mobile cooler racks 24 inches wide and with adjustable shelf heights are recommended. These racks can be used to store many different products and can be moved about inside or outside the cooler to facilitate cleaning.

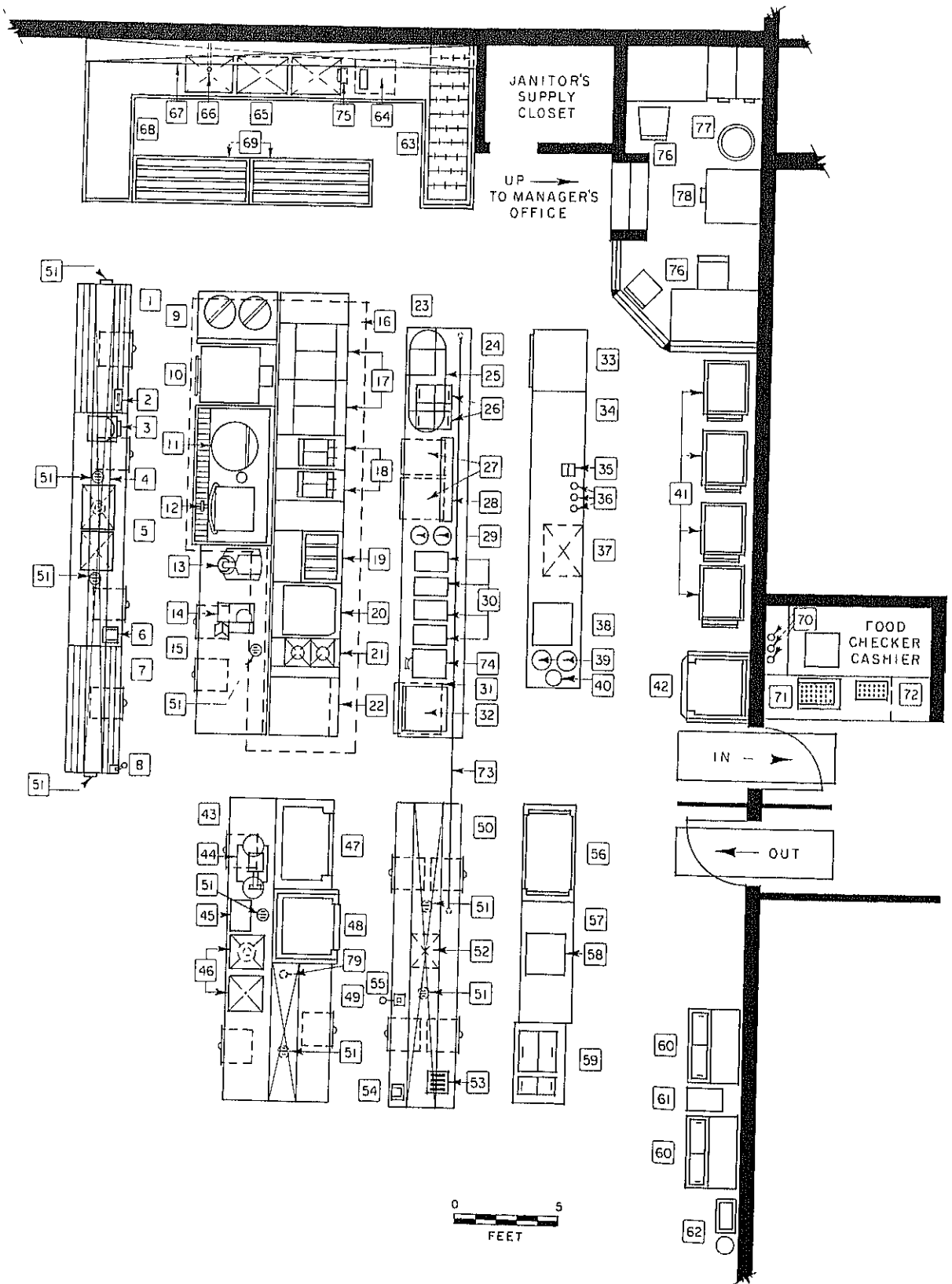
Exterior temperature gages (item 15 in figure 11) should be mounted at eye level on the exterior wall of the cooler to enable personnel to spot check temperatures without entering the cooler or the freezer. Fruits and vegetables should be held at temperatures between 32° and 36° F., at a relative humidity of 95 percent. Meat in the walk-in cooler should also be held at temperatures between 32° and 36° but at a

relative humidity of 85 percent. The maintenance of the temperature range and humidity levels specified will prolong the shelf life by reducing dehydration of vegetables and sliming of meats.

Work center layouts

Figure 14 shows the equipment location for the meat and vegetable preparation and cooking, salad preparation, and pot and pan washing work centers. In addition, the location of office equipment in the manager's office and equipment in the checker-cashier's station is shown.

The walls in the kitchen are faced with white ceramic tile, and ceramic tiled floors are pitched to floor drains for cleaning ease. Floor areas adjacent to sinks should have adhesive-backed, abrasive strips positioned to reduce the hazard from slipping and falling. A sufficient number of fluorescent fixtures are required to supply



from 35 to 50 foot-candles of illumination. Perforated asbestos-board panels with mineral-fiber pads are recommended for the ceiling because they greatly reduce the noise level, are fire resistant, can be easily cleaned, and can be repainted without an appreciable loss of acoustical properties.

Aisleways should be wide enough to allow employees carrying food products a clear passage free of collision hazards with other employees or pieces of equipment. Where one employee works alone, the minimum aisle width is 3 feet. Where employees must pass each other, the minimum aisle width is 3 feet, 6

inches. Where mobile equipment is used, the minimum aisle width is more than 4 feet.

The worktables in both the meat and vegetable preparation and the salad preparation work centers are provided with knife wells, drawers, overshelves, and undershelves. The knife wells (item 51) provide employees with storage space for sharp cutting tools, thereby reducing the hazard from tabletop storage. Overshelves are ideally suited for the storage of spices and similar small items; undershelves are used for such items as miscellaneous pans and mixer attachments. These storage space provisions promote efficiency by enabling employees to work at uncluttered tables.

←

FIGURE 14.—Layout for meat and vegetable preparation and cooking, salad preparation, and pot and pan washing centers in occasion-type restaurant.

Kitchen equipment schedule

- | | | |
|--|---|--|
| 1. Wood top butcher's table with drawer | 27. Refrigerated drawers (2) | 54. Portion scale |
| 2. Tenderizer | 28. Infrared strip food warmer | 55. Can opener |
| 3. Grinder | 29. Plate dispensers (2) | 56. Reach-through salad refrigerator (sliding-door type) |
| 4. Overshelf | 30. Hot food wells (4) | 57. Stainless steel salad and cold plate pickup table |
| 5. Stainless steel butcher's worktable with double-compartment sink, disposal, and drawers (2) | 31. Refrigerated drawer | 58. Ice pan |
| 6. Portion scale | 32. Microwave oven | 59. Ice cream freezer |
| 7. Wood top butcher's worktable with drawer | 33. Hot food holding cabinet | 60. Ice cube machine |
| 8. Can opener | 34. Stainless steel order coordinator's and waiter's pickup table (hot food) | 61. Ice cube crusher |
| 9. Pressurized deep fat fryer | 35. Time stamp clock | 62. Hand sink and trash can |
| 10. Convection oven | 36. Pneumatic delivery tubes | 63. Stainless steel soiled pot and pan landing table with skate-wheel conveyor |
| 11. 40-gallon trunnion kettle and water arm | 37. Roll warmer (under table) | 64. Disposal (8 h.p., hammermill type) |
| 12. Steamer | 38. Ice pan | 65. Three-compartment pot and pan sink |
| 13. 20-quart mixer | 39. Heated soup wells (2) | 66. Flexible spray rinse arm (supplied with 180° F. water) |
| 14. Slicer | 40. Soup bowl dispenser | 67. Stainless steel overshelf |
| 15. Stainless steel worktable with drawers (2) | 41. Food carts (4) | 68. Stainless steel clean pot and pan landing table |
| 16. Exhaust canopy | 42. Reach-in wine refrigerator | 69. Stainless steel clean pot and pan storage racks (2) |
| 17. Closed top ranges (2) | 43. Stainless steel salad preparation table with drawers (2) | 70. Pneumatic delivery tubes |
| 18. Deep fat fryers (2) | 44. Food cutter | 71. Cash register |
| 19. Open top broiler | 45. Recessed cutting board | 72. Item counter |
| 20. Griddle | 46. Double-compartment sink with in-sink disposal | 73. Food order wire |
| 21. Open top burner | 47. Reach-in salad refrigerator (sliding-door type) | 74. Counter top steamer |
| 22. Closed broiler | 48. Reach-in freezer | 75. Recirculating pump |
| 23. Recessed cutting board | 49. Stainless steel salad preparation table with overshelf and drawer | 76. Desks (2) |
| 24. Stainless steel cook's assembly table | 50. Stainless steel salad preparation table with overshelf, drawers (4), and undershelf | 77. File cabinets (2) |
| 25. Overhead pot, pan, and utensil rack | 51. Knife wells (9) | 78. Safe |
| 26. Covered hot food wells | 52. Single-compartment sink | 79. 180° F. water tap |
| | 53. Toaster | |

Meat and vegetable preparation

The advent of such convenience food items as frozen vegetables, sauces, and portioned meat cuts for the food service industry challenges the economic feasibility of this work center. Many restaurateurs who participated in this study indicated that local products were being used in season and convenience items the rest of the year. Some indicated that they would not include a meat and vegetable work center in a new restaurant.

The arrangement of equipment items 1 through 15 (fig. 14) is representative of a meat and vegetable preparation layout. Meat is cut

and vegetables are trimmed on the wood top worktables (items 1 and 7) and the stainless steel worktables with double-compartment sink (item 5). The garbage disposal unit in the sink reduces the need for scrap cans. Figure 15 is a view of a part of this type work center.

The pressurized deep fat fryer (item 9 in figure 14) is used for volume production of fried items for banquets and parties. The convection oven (item 10) is used during meal periods for baking potatoes and at other times for preparing standing rib roasts, turkeys, and similar items. The 40-gallon trunnion kettle (item 11) is used primarily for making soup stock. The

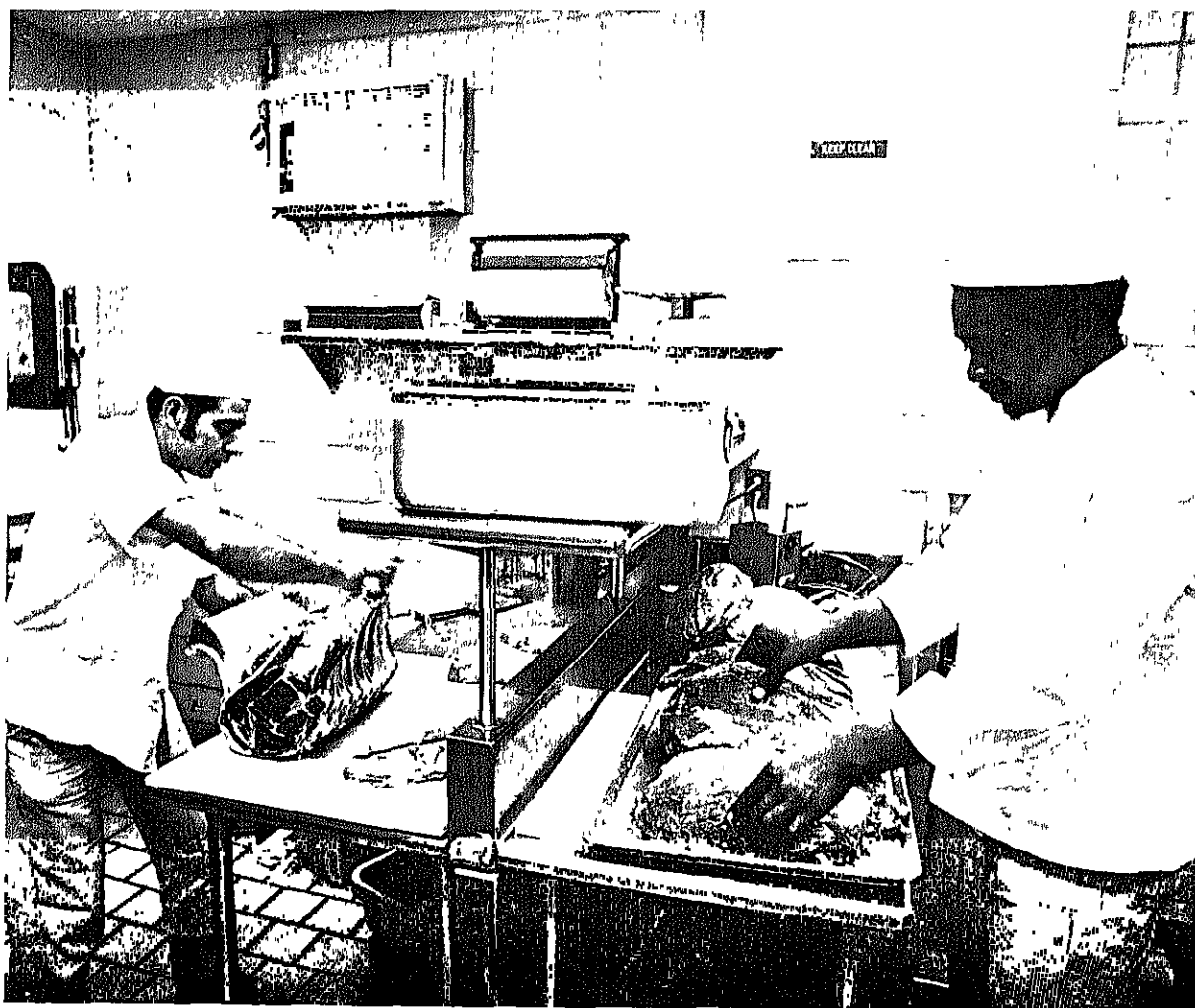
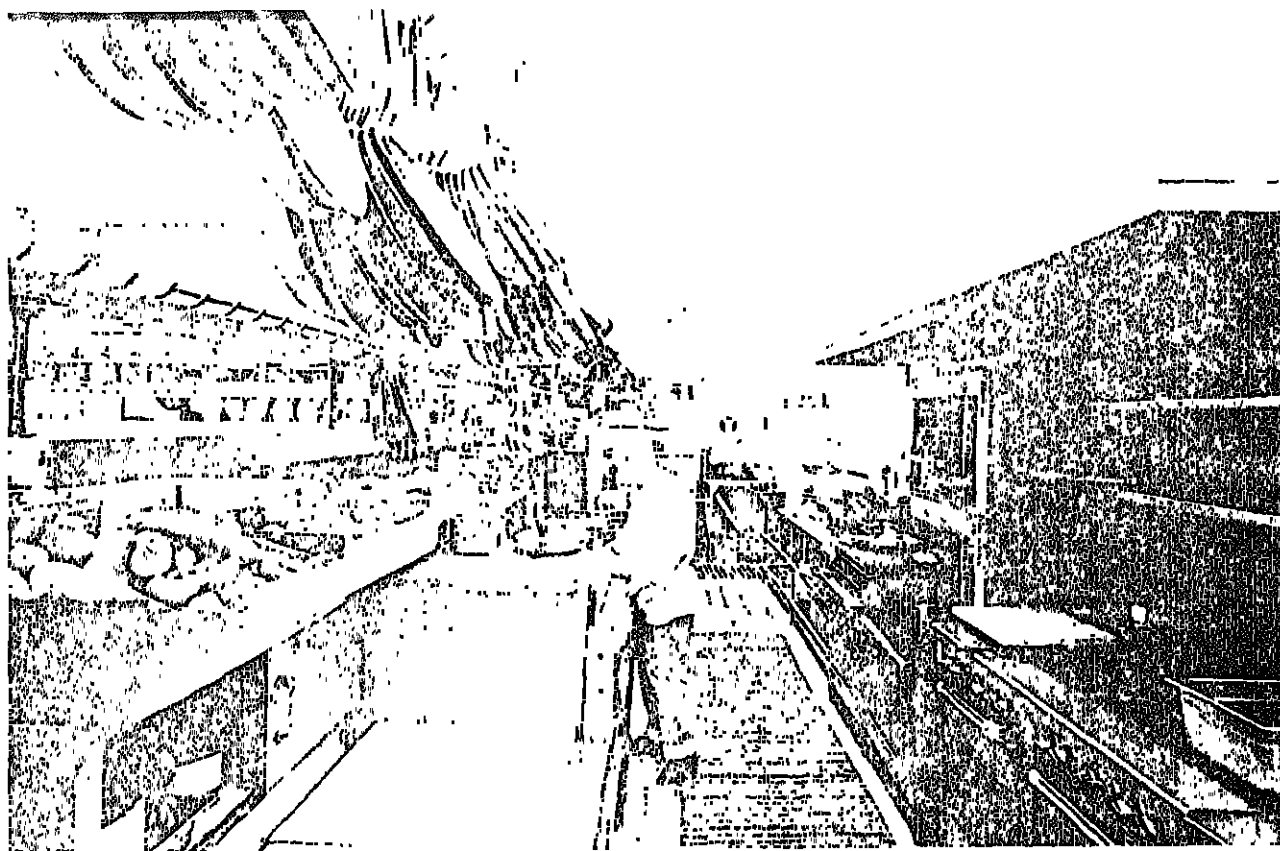


FIGURE 15.—Part of meat and vegetable preparation work center.

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FIGURE 16.—Meat and vegetable cooking work center.

steamer (item 12) is used for preparing in-season, fresh vegetables and for batch cooking of vegetables for banquets. The mixer (item 13) on the stainless steel worktable (item 15) is used primarily for making sauces and for chopping and cubing vegetables. The slicer (item 14) is used here for slicing meat for hot sandwiches and in the salad department if required for slicing cold cuts.

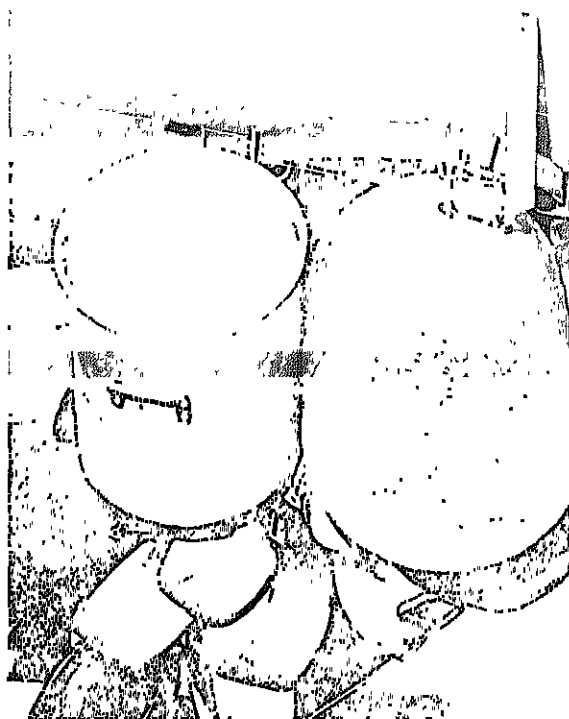
Meat and vegetable cooking

Figure 16 is a view of part of the equipment in a meat and vegetable cooking work center. Items 16 through 42 and items 73 and 74 in figure 14 identify and locate the specific items that are related to the meat and vegetable cooking work center.

Products flow from either the meat and vegetable preparation work center or the walk-in boxes to undercounter (base cabinet) re-

frigerated drawers (items 27 and 31). Hot food is held in the hot food wells (items 26, 30, and 39) or beneath the infrared strip food warmer (item 28). Batch-cooked vegetables for banquets are held in the hot food cabinet (item 33). Clean pots and pans are stored on an overhead rack (item 25) opposite the closed top ranges (item 17). Figure 17 shows a typical installation of an overhead pot and pan rack.

Closed top ranges are preferred by many operators. These ranges have a larger heating surface than the open top burner type. The open top burner (item 21 in figure 14) is used primarily for back-up or overflow for the closed top ranges and for miscellaneous work. Grilled and broiled products are produced on items 19, 20, and 22. The microwave oven (item 32) is also used in the production of grilled items to reduce time requirements. The counter top steamer (item 74) is used for small-batch cooking of frozen vegetables.



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FIGURE 17.—Pot and pan rack installation.

The cooking batteries in the meat and vegetable preparation and cooking work centers are vented with the same exhaust canopy (item 16). The exhaust system should have sufficient capacity to remove cooking odors, smoke, moisture, and grease vapors without creating drafts when doors are opened.² A slight negative air pressure in the kitchen will keep offensive odors out of dining areas. An air change rate of 20 to 30 times per hour is recommended for kitchens.

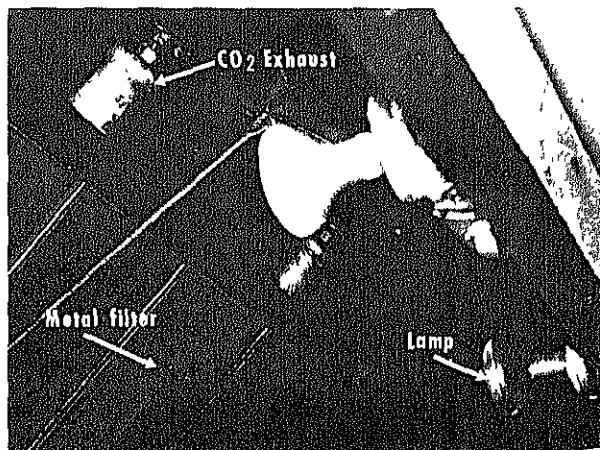
Grease fires originating in the exhaust system create the greatest fire hazard in the kitchen. These fires are caused by grease buildups within the ducts and the canopy as a result of inadequate filtration or poor cleaning practices or both. This hazard can be reduced by the installation of automatic dampers that close when temperatures exceed 360° F. A carbon dioxide

² Additional information concerning ventilation can be obtained from the American Society of Heating and Ventilation Engineers, 51 Madison Avenue, New York 10010.

fire extinguishing system is recommended. Stainless steel hoods with rounded and accessible corners for cleaning ease should be from 2 to 3 feet above heating surfaces. Vaporproof fixtures are recommended for illumination. Figure 18 is an interior view of such an exhaust canopy.

The meat and vegetable work center illustrated in figure 14 was designed for "continental" or "cart-type" dining room service. An order coordinator receives the customer's order from the dining room by way of a pneumatic tube system (item 36). Received orders are clipped to food order wire (item 73). Orders for cold sandwiches and salads are slid down the order wire to the salad work center. Orders for hot foods are slid down the wire to the meat and vegetable cooks. When an order is ready for delivery, the order coordinator notifies the waiter by means of a call lamp system. Further details concerning the call lamp can be found under "Family-Type Restaurants," p. 48. Customer orders are stamped with the time stamp clock (item 35) when they go into the kitchen and when they leave the kitchen. The stamping serves two purposes: (1) It determines gross makeup time and (2) it provides a means of control.

Waiters pick up orders from the order coordinator's table (item 34) with a cart (item 41). They check the order with the food checker-cashier and then deliver the order to the customer. When the customer completes the meal,



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FIGURE 18.—Interior view of exhaust canopy section.

the waiter sends the check and cash or credit card from the waiter's station to the cashier by means of the pneumatic tube system (item 70). This system reduces waiter walking requirements and eliminates the need for a separate food checker and cashier.

Figure 19 shows a steamtable section for conventional waiter pickup. Orders are filed directly

with the cooks, along with a duplicate copy of the guest check. The cook places the duplicate copy of the guest check beneath the guest check clip while the order is being assembled. Each waiter has a designated pickup section on one of the two overshelves. The assembled order is placed in the appropriate waiter's pickup section on the overshelf. The waiter is then notified

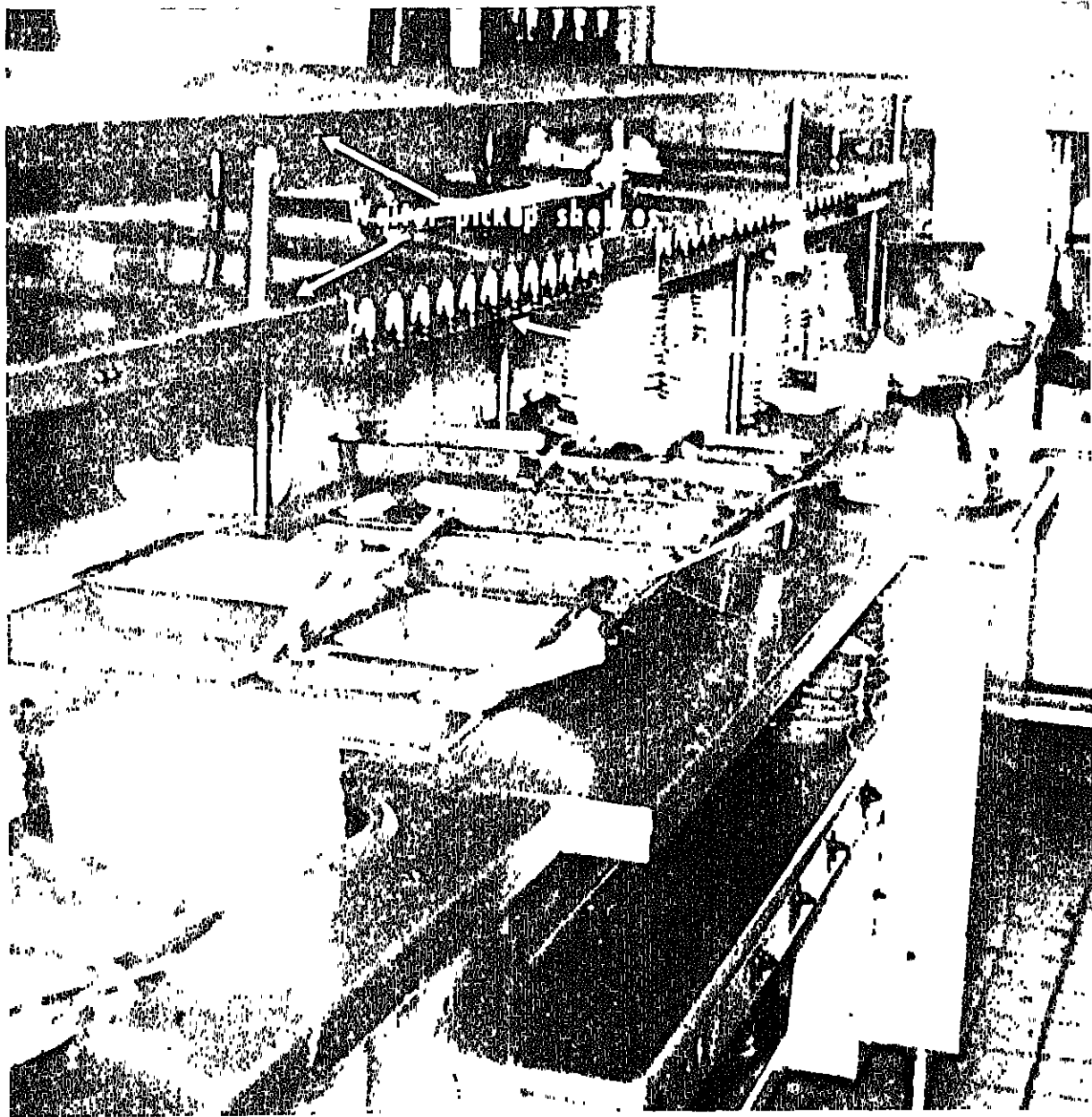


FIGURE 19.—Steamtable.

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with a call lamp system that the order is ready for delivery.

At the end of the day, the guest checks for each waiter are totaled and compared with the totals of the original checks at the cashier's station. This practice discourages pilferage.

Salad preparation

Figure 20 shows a part of a salad preparation work center. Items 43 through 59 and item 79 in figure 14 identify and locate specific items of equipment in the work center. This center is designed to facilitate the flow of raw material from the walk-in cooler to finished production with a minimum of backtracking. The raw

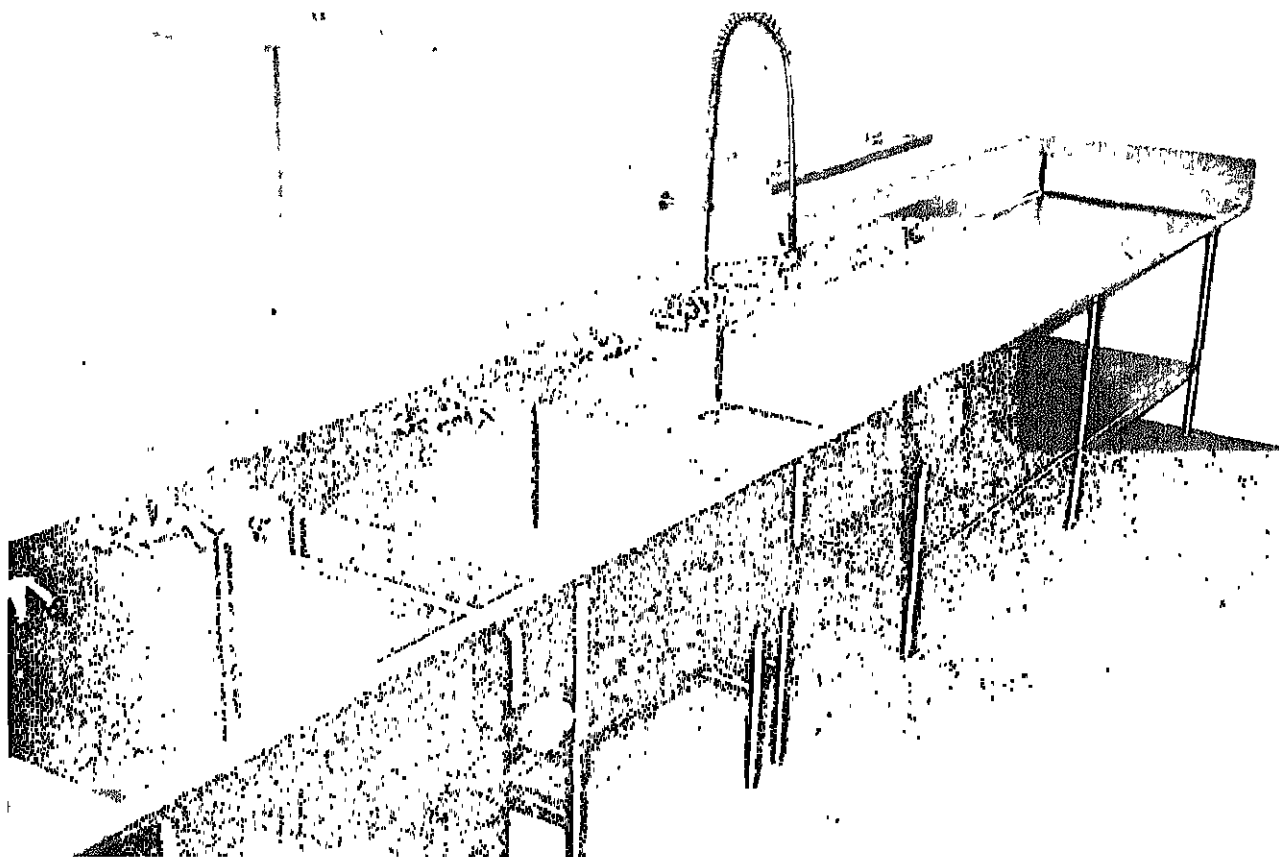
product is brought to the stainless steel table (item 43) with double-compartment sink (item 46) for washing and trimming. A garbage disposal in the sink eliminates the need for scrap cans. Temporary storage for washed and trimmed products is provided by the reach-in refrigerator (item 47). A 180° F. water tap (item 79) is mounted in the stainless steel table (item 49) for the preparation of gelatin-type salads and desserts. The adjacent table (item 50) is used to make up salads, cold sandwiches, and desserts.

The table (item 57) adjacent to the dining room exit and entrance doors from the kitchen is used as the waiter's cold food pickup table. A



FIGURE 20.—Salad preparation work center.

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FIGURE 21.—Three-compartment pot and pan sink and landing table.

built-in ice pan (item 58) is used for the storage of special salads such as the "chef's salad." Small individual bowls of salad are batch prepared and stocked in the reach-through salad refrigerator (item 56). The freezer (item 59) located at the end of the table is used for ice cream storage.

Pot and pan washing

Figure 21 shows a three-compartment sink and a clean landing table in a pot and pan washing work center. The location of specific pieces of equipment is indicated by equipment schedule items 63 through 69 and item 75, all in figure 14.

Soiled pots and pans are placed on an inclined skate-wheel conveyor (item 63). Gravity flow of soiled pans toward the wash sink reduces employee walking requirements. A recircula-

ting centrifugal pump (item 75) agitates the water in the wash sink and thus expedites the removal of food from pans and utensils. Clean pans are spray rinsed with 180° F. water from the overhead spray rinse arm (item 66) above the third sink. This practice not only speeds the air-drying process but is also a good sanitation practice. The dry pans are moved from the clean landing table onto the storage racks (item 69) which face production areas to minimize walking distances.

Dishroom

The dishroom plan shown in figure 22 is conducive to straight-line production flow in a circular path. Trays of soiled dishes are deposited on the tray rail (item 3) either by waiters or bussing personnel. Soiled linen is placed in a wall-mounted, metal linen hamper (item 2), and silverware is deposited in the

silverware chute (item 7). The linen hamper is designed with a hinged bottom for easy removal of linen at the end of the day. Dining

room personnel place cups, saucers, glassware, and similar items into appropriate racks on the soiled dish table (item 4).

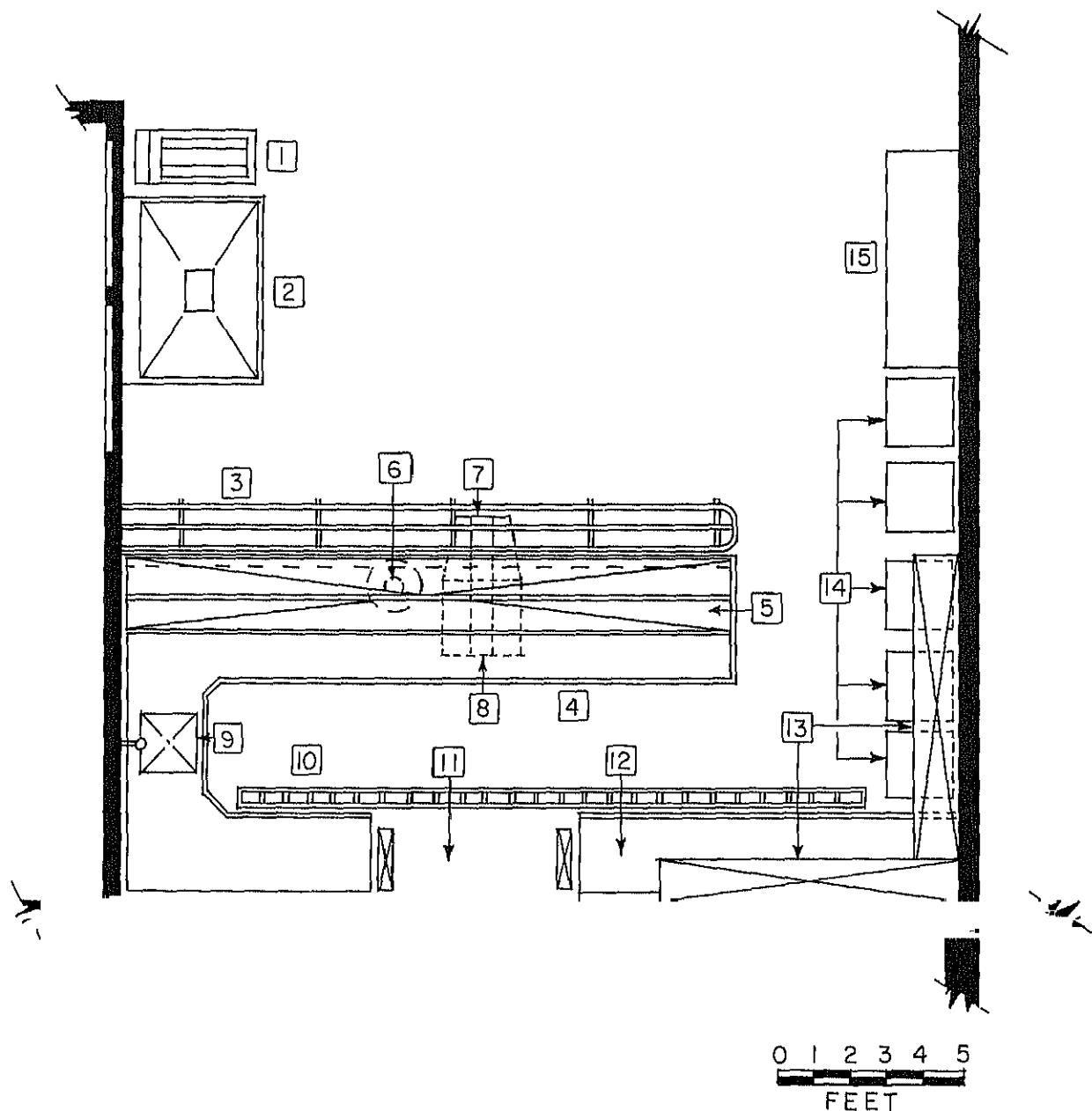
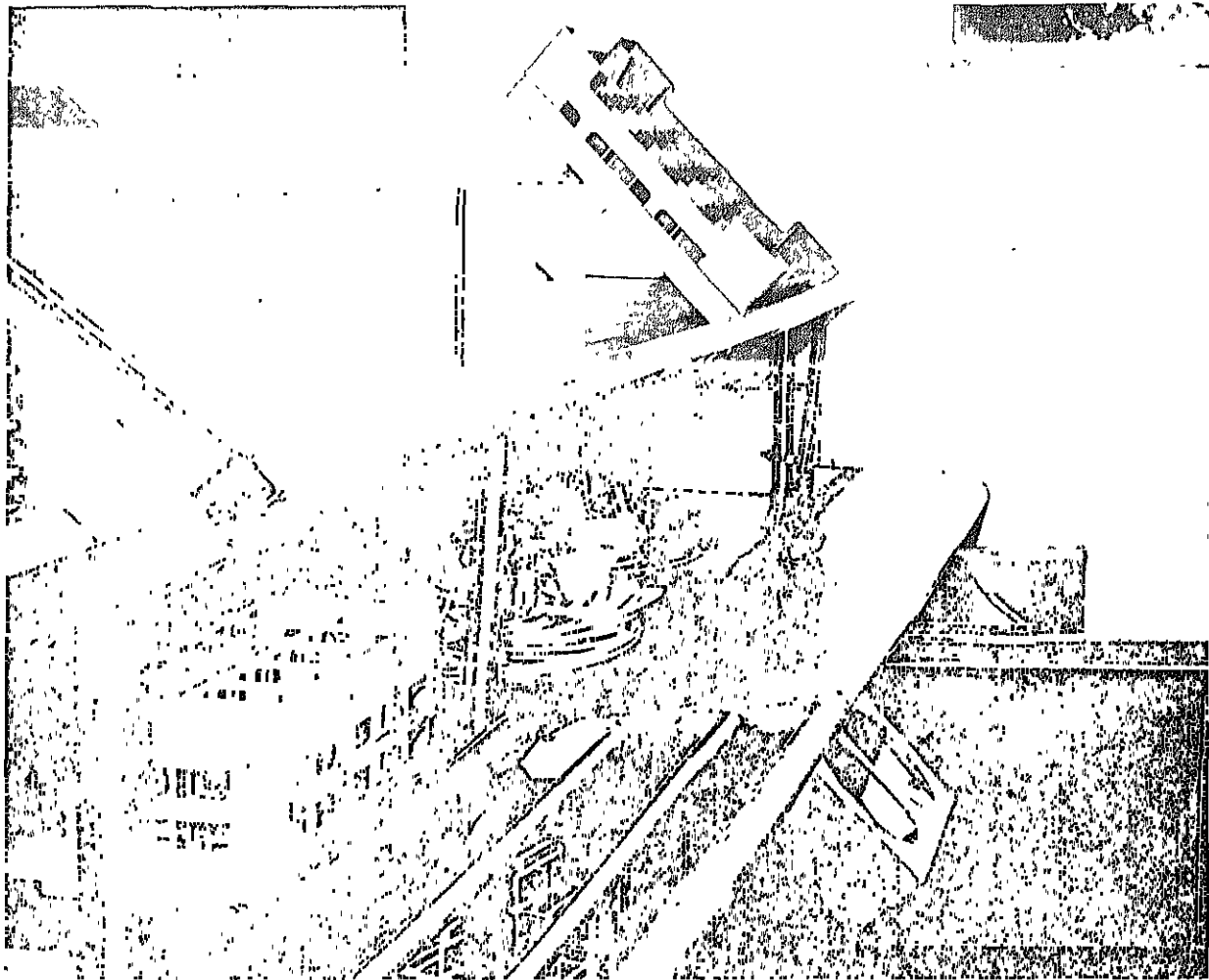


FIGURE 22.—Layout for dishroom.

Equipment schedule

- | | | |
|-------------------------|---|---------------------------|
| 1. Silver burnisher | 6. Disposal (3 h.p., hammermill type) and scrap chute | 10. Dish rack conveyor |
| 2. Linen hamper | 7. Silverware chute | 11. Dish machine |
| 3. Tray rail | 8. Silverware soak tank | 12. Clean dish table |
| 4. Soiled dish table | 9. Pre-rinse sink with flexible spray rinse arm | 13. Oversheaves (2) |
| 5. Glass rack oversheaf | | 14. Dish rack dollies (5) |
| | | 15. Storage cabinet |



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FIGURE 23.—Soiled dish table.

Figure 23 shows the side of the soiled dish table where dining room personnel break down trays. One of the desirable features of this table's design and construction is the glass rack oversheaf. The glass rack is supported in an inclined position by a piece of stainless steel tubing at the top. The bottom of the rack rests in a Vee groove formed in the oversheaf. Water drains from the shelf's surface into the Vee groove and through the shelf support and table legs to a floor drain. Dining room personnel push the filled glass racks through the table on the oversheaf to the dish machine operator.

Racks of presorted, soiled china, glasses, and silverware are processed through the dish

machine (item 11 in figure 22). Clean items are removed from the racks at the clean dish table (item 12) and placed in dollies (item 14). Miscellaneous items such as sugar bowls and creamers are temporarily stored on overselves (item 13) and then transferred to the storage cabinet (item 15). Empty dish, silverware, and glass racks are placed on the inclined roller conveyor (item 10), which carries them to the soiled dish table.

Waiter's station

Figure 24 shows the layout for a waiter's station that is centrally located in the dining room. The station was designed with a 3-foot-wide aisle for one-way traffic. Dining room

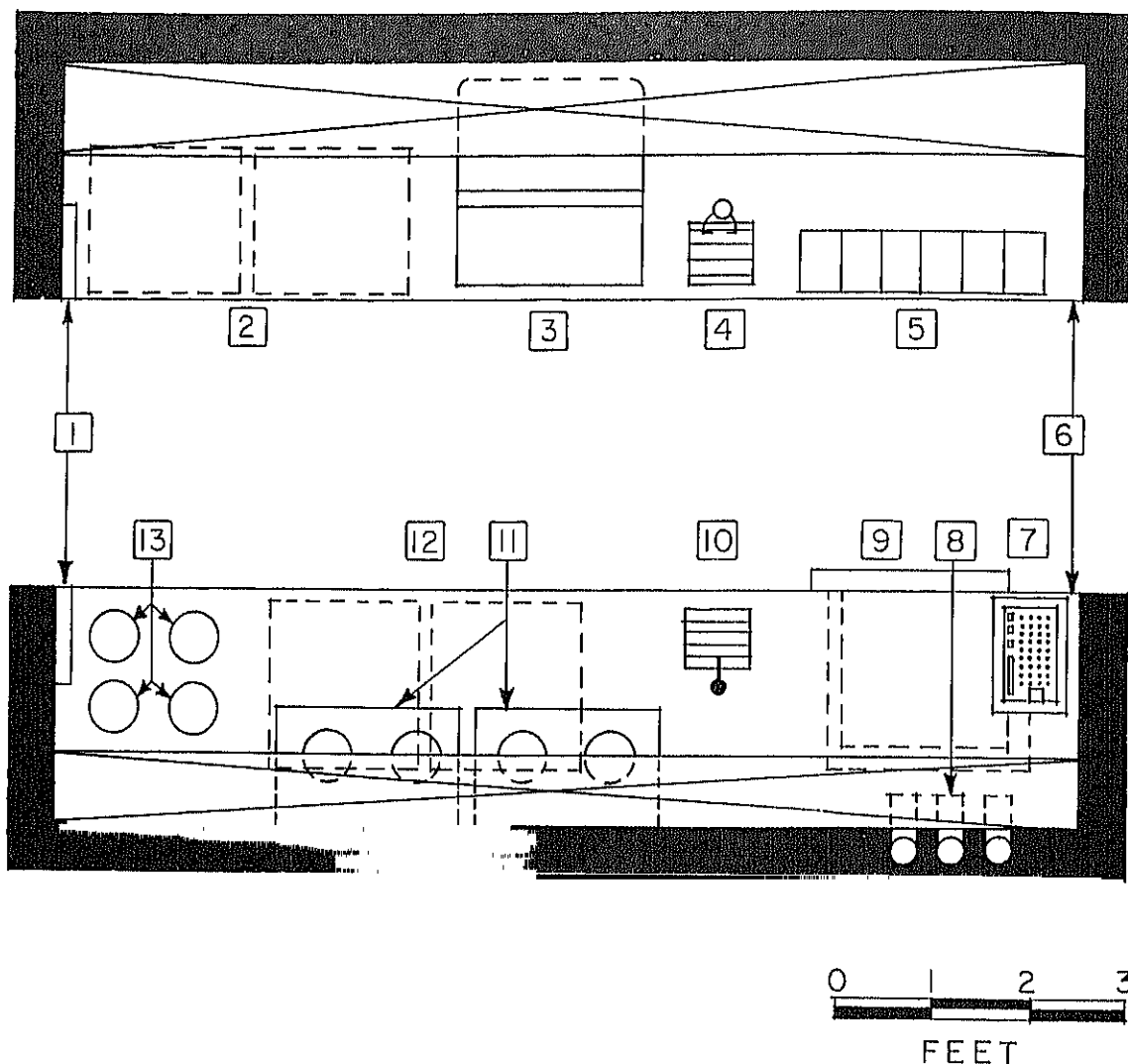


FIGURE 24.—Layout for waiter's station.

Equipment schedule

- | | |
|--|-------------------------------|
| 1. Menu card racks (2) | 7. Adding machine |
| 2. Under counter glass racks | 8. Pneumatic delivery tubes |
| 3. Ice bin | 9. Base cabinet refrigerator |
| 4. Water dispensing head | 10. Hot water dispensing head |
| 5. Silver storage bins (6) | 11. Coffee makers (2) |
| 6. Waiter's service stand with
overshelves and undershelves | 12. Under counter cup racks |
| | 13. Saucer storage wells (4) |

personnel use this station to obtain nonalcoholic beverages, clean silverware, and table linen. The base cabinet refrigerator (item 9) is used primarily for storing coffee cream. Clean linen is stored on the overshelves. Checks are routed to the kitchen or the cashier by means of the pneumatic tube system (item 8). The adding machine (item 7) is used for totaling checks.

Bartender's station

A bar layout is shown in figure 25. Liquors and wines are stored in a locked cabinet (item 2) and in a base cabinet refrigerator (item 4) located behind the bar. A glass-shelf liquor display (item 3) is located above the storage cabinet and adjacent to the base cabinet refrigerator. Two three-compartment sinks (item

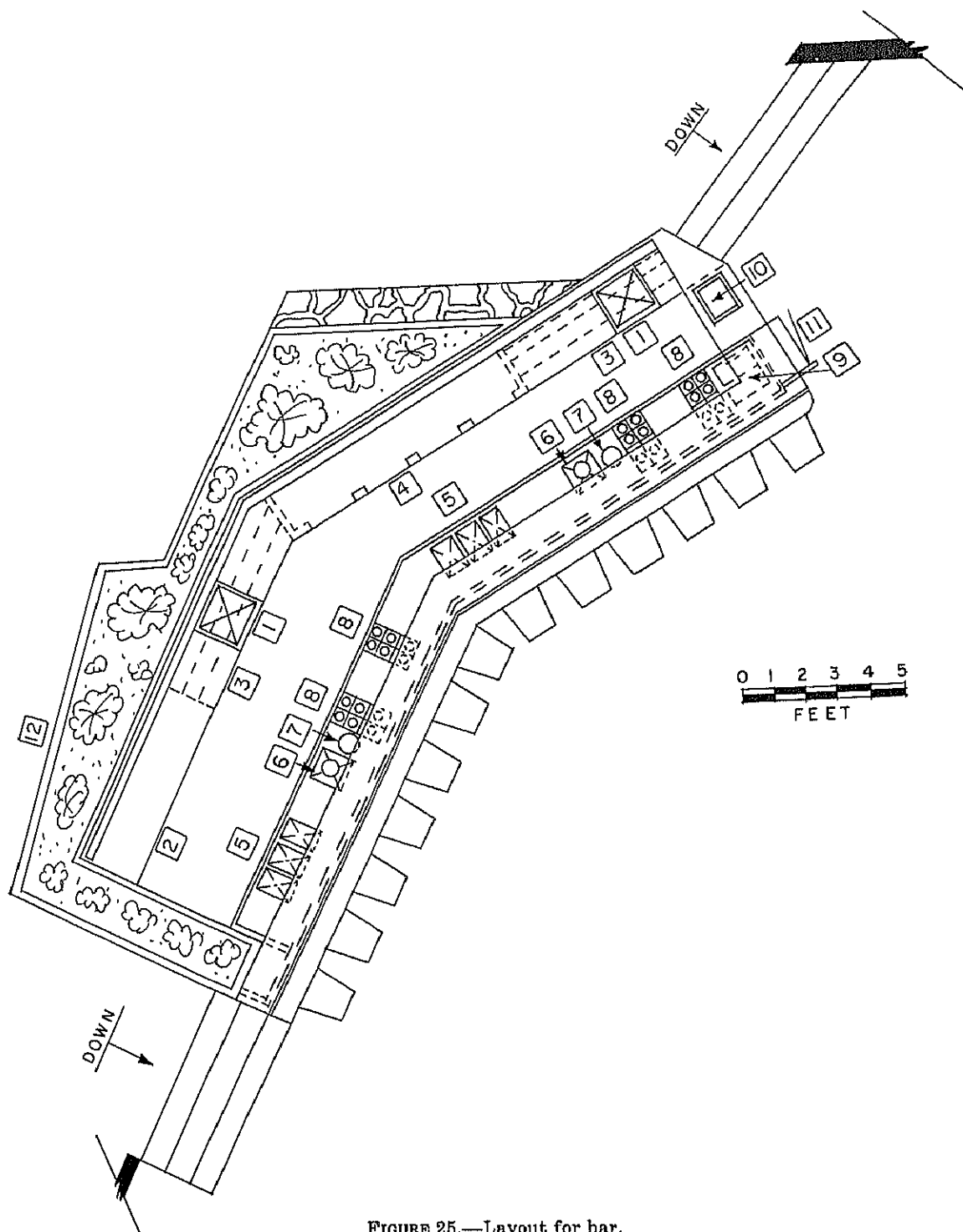


FIGURE 25.—Layout for bar.

Equipment schedule

- | | | |
|----------------------------------|---|------------------------------|
| 1. Bar cash registers (2) | 4. Base cabinet refrigerator,
back bar | 8. Glass racks (4) |
| 2. Locked liquor storage cabinet | 5. Three-compartment sinks (2) | 9. Ice bin |
| 3. Liquor display | 6. Disposals (2) | 10. Glass chiller |
| | 7. Blenders (2) | 11. Soda cabinet (under bar) |
| | | 12. Planter |

5) have been installed for washing glasses. From the end of the bar in the upper right-hand corner of the figure, waiters pick up beverages for dining room customers and for customers seated in the cocktail lounge.

Customer service facilities

One of the essential factors that directly affect the success of an occasion-type restaurant is the design of customer service facilities that will create a leisurely and relaxed dining atmosphere and result in a high check average for each customer. The restaurants that participated in this study met these objectives by tastefully furnishing their establishments in such a manner as to augment sales. The data presented in tables 1 and 2 indicate that the occasion-type restaurants had a low seat turnover ratio (1.4 customers per day) compared with the turnover ratio in family-type restaurants (8.6 customers per day). These data also

indicate that to maintain a satisfactory return on investment, the customer check average of an occasion-type restaurant should be more than \$6.00, or five times that of a family-type

Figure 26 shows a customer lounge that was designed to promote wine sales in one of the occasion-type restaurants. The room was illuminated by miniature spot ceiling lamps and a wrought-iron candelabrum. The customer enters this octagon-shaped lounge through one of eight gothic arches. Three of these arches lead to a wine cellar where wine bottles are stored on inclined shelves in refrigerated display cases. The other five arches lead to the cocktail lounge, public restrooms, the checkroom, and the dining room.

One of the restaurants that participated in the study promoted the sale of beef entrees by displaying various meat cuts on a table with a floral arrangement. The display (fig. 27) was

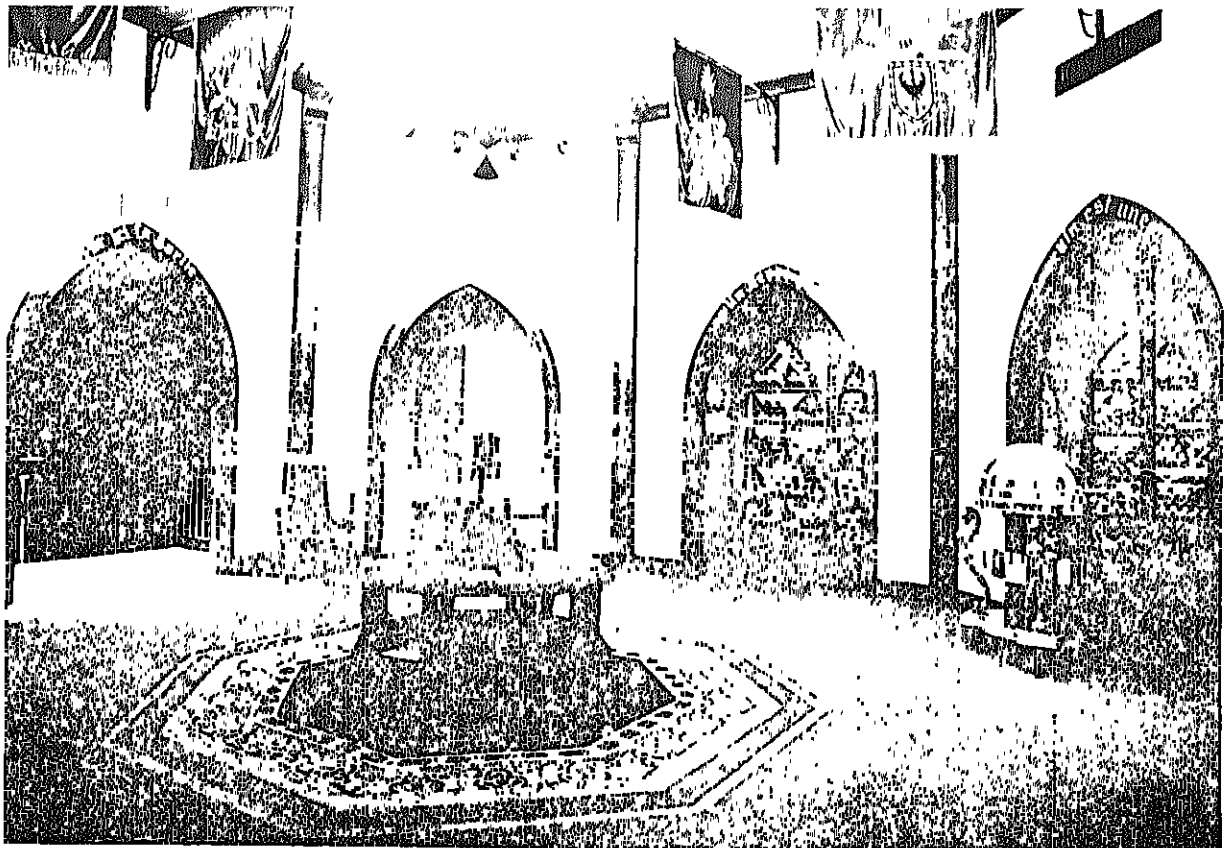


FIGURE 26.—Customer lounge.

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FIGURE 27.—Meat display.

located in the customer lounge and was periodically changed during serving hours to eliminate loss from spoilage.

Some restaurants promote the sale of desserts by displaying these on a mobile cart that is brought to the table so the customer can see the desserts before he decides which he prefers (fig. 28).

Because customers of an occasion-type restaurant spend a longer time there than customers of a family-type restaurant, the availability of tables often becomes critical on weekends and holidays. One means of making it more acceptable to customers to wait for a vacant table, and at the same time increase sales, is to install a cocktail lounge such as the one shown in figure 29. Some of the operators who participated in the study set up portable hardwood flooring and had a three-piece dance band on weekends, creating a miniature nightclub environment.

Another method that is used to increase table turnover and stimulate sales is to set up a buffet table or miniature cafeteria line just inside the entrance to the dining room. The table should be provided with a portable sneeze guard for sanitation. This guard can be easily transported to and placed on the table before the meal period. The use of this limited menu buffet

enables customers to serve themselves, eliminates food ordering and delivery delays, and reduces dining room personnel requirements.

An effective method of promoting the sales of higher priced menu items is to prepare flaming entrées at the customer's table. The preparation of one of these entrées is shown in figure 30. This specialized and colorful service induces customers at nearby tables to place similar orders. Mobile stainless steel carts with drop leaves can be used effectively for this type of service. Cooking heat is usually supplied from rechards using canned heat for fuel. Storage space for wines and spices should be provided on the cart.

The capital investment required for furnishing customer facilities in an occasion-type restaurant is generally greater than that for other types of restaurants. Because the seat turnover on a daily basis is somewhat low, the best possible use must be made of all dining room space to make sure of adequate return on investment. The most common and possibly the best method of getting the most use from available dining room space is the use of convertible tables so that seating arrangements can be changed or extra seats added. Figure 31 illustrates a four-place table converted to a six-place table by raising circular drop leaves. When not in use, the leaves are folded flush to the table bottom so they will not be in the way of customers' legs when the table is being used for four-place settings. Figure 32 shows a two- and a four-place table converted into an eight-place table. A collapsible metal leaf is used as a "bridge" between the two tables.

Several of the restaurateurs who participated in this study took reservations for social parties and dinner meetings for various civic and business organizations. An effective method of providing privacy and all the seating needs for such groups is to suspend sliding, soundproof partitions from the ceilings. These partitions are secured to the ceiling in a metal track and when not in use, may be stored in a full-length wall closet or pushed against the wall (fig. 33). Partitions can be obtained commercially with prefabricated doorways installed. Doorways should lead to a main aisleway in the dining room or to a service hallway to reduce traffic interference with other customers.

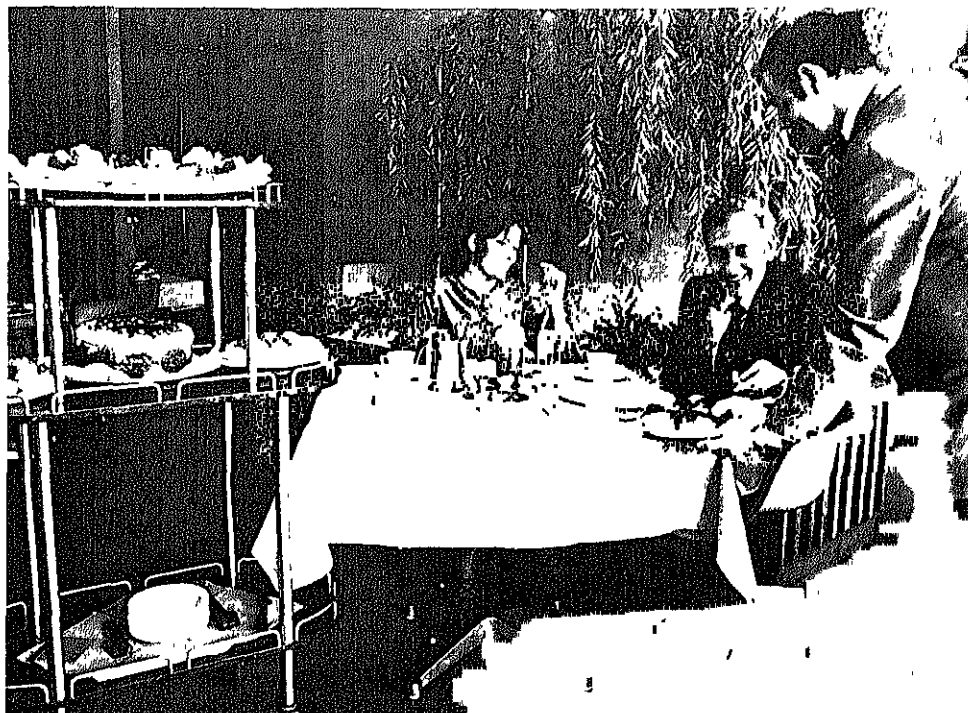


FIGURE 28.—Dessert tray.

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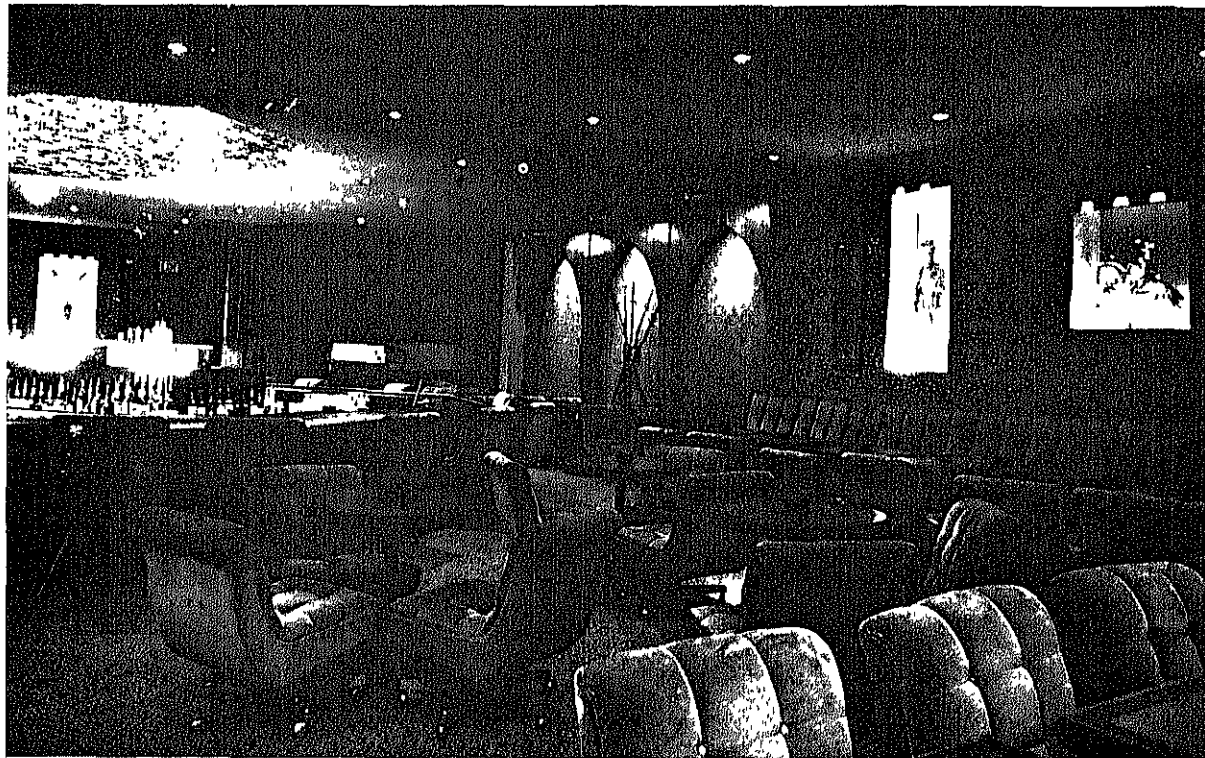


FIGURE 29.—Cocktail lounge and bar.

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FIGURE 30.—Flaming entrée preparation.

Family-Type Restaurants

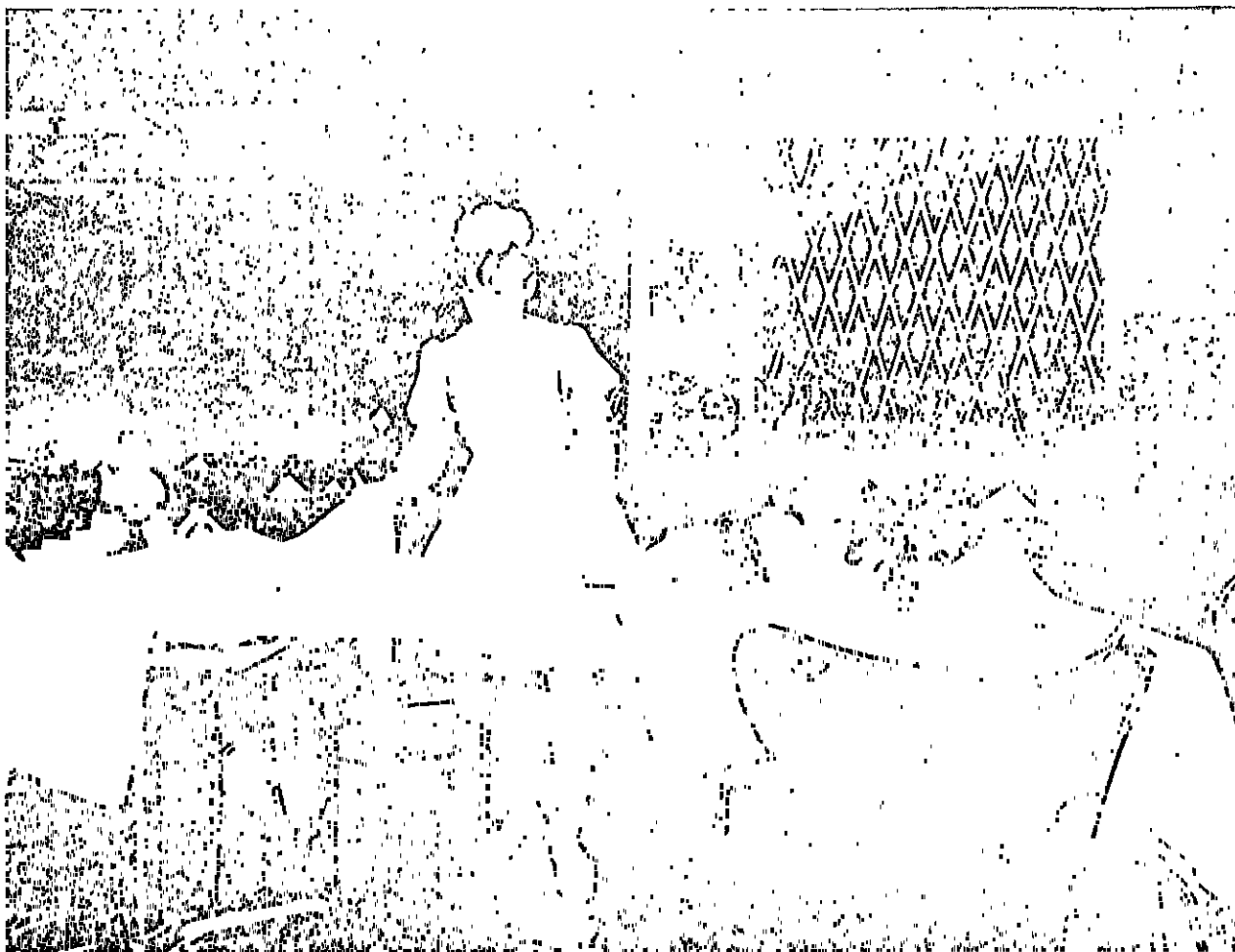
A modified layout for one of the family-type restaurants that participated in this study is shown in figure 34. This layout is similar to the layout for the occasion-type restaurant (fig. 10) except that it is smaller and has a combination work center for meat, vegetable, salad, and dessert preparation and pot and pan washing (item 5). Straight-line product flow is indicated by lines connecting the storage, production, and dining room facilities.

Raw material is delivered and checked at the employee and receiving entrance. It is then transported into either the storeroom (item 1) or the walk-in coolers (items 2 and 3) or freezer (item 4). Raw material flows from the storage areas into the combination work center (item 5) and then into the meat and vegetable cooking area (item 6). The finished product is delivered to customers at the dining room coun-



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FIGURE 31.—Dropleaf table.



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FIGURE 32.—Two- and four-place tables converted to eight-place table.

ter (item 8), in the dining room (item 9), or at the customer takeout counter (item 10). Soiled tableware from the dining room and the counter is delivered to the dishroom (item 7) by a belt conveyor. Soiled pots and pans are transported from the meat and vegetable cooking area (item 6) to the combination work center (item 5) for cleaning. Employee lockers, the equipment room, and miscellaneous storage facilities are located in the basement.

Additional details concerning equipment and design related to employee facilities and storage areas are presented in the previous section of this report entitled, "Occasion-Type Restaurants," page 20. The primary difference between the facilities of a family-type restaurant and

those of an occasion-type restaurant is that the family-type restaurant requires less storage and employee facility space (square feet of area) because it has fewer menu items and fewer employees.

Work center layouts

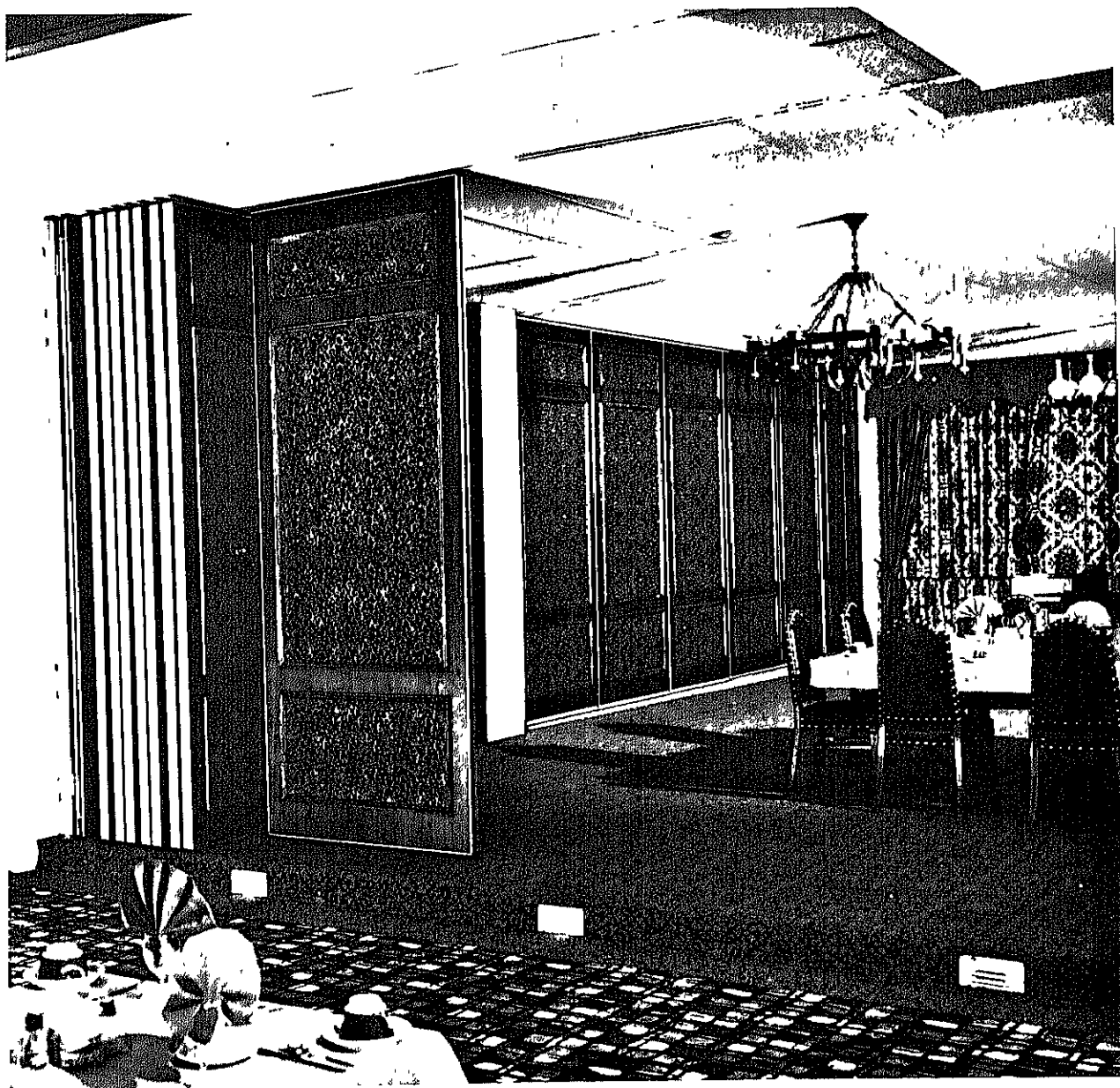
Figure 35 shows the equipment location in the kitchen, including the customer takeout counter area, for a family-type restaurant. This type of design facilitates straight-line material flow from raw material to the finished product. Items 3 through 17 identify and locate items of equipment associated with the combination work center for meat, vegetable, salad, and dessert preparation and pot and pan washing:

items 18 through 34, meat and vegetable cooking; items 40 through 55, customer takeout; and items 56 through 63, the dishroom.

Combination work center

This combination work center (fig. 36) is designed so that meat, vegetables, salads, and desserts all can be prepared and pots and pans can be washed in the same work center.

In this work center, the stainless steel worktables (items 3, 9, and 13 in figure 35) are designed with drawers and knife wells (item 1) so that employees can safely store sharp cutting tools when these tools are not in use. Composition cutting boards (item 2) were preferred over other types by many operators because they were light weight, abrasion resistant, and easily cleaned.



PN-2369

FIGURE 33.—Sliding partitions in dining room.

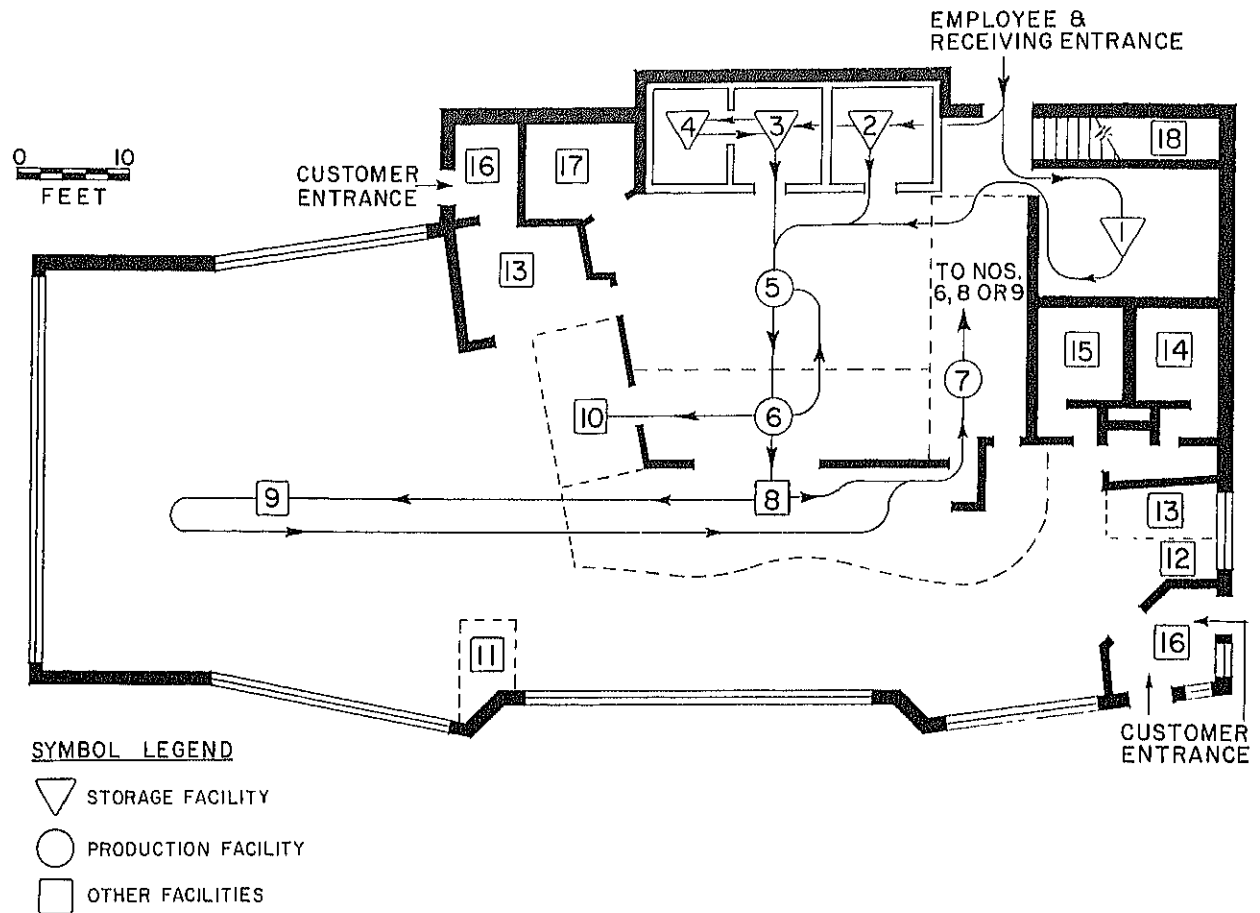


FIGURE 34.—Layout for family-type restaurant.

Facility legend

- | | | |
|--|------------------------------------|---|
| 1. Storeroom | 6. Meat and vegetable cooking area | 13. Customer lounge (2) |
| 2. Dairy and vegetable walk-in cooler | 7. Dishroom | 14. Men's restroom |
| 3. Meat walk-in cooler | 8. Dining room counter | 15. Women's restroom |
| 4. Walk-in freezer | 9. Dining room | 16. Customer entry and exit |
| 5. Combination meat and vegetable preparation, salad preparation, and pot and pan washing area | 10. Takeout area | 17. Manager's office |
| | 11. Waiter's station | 18. Employee lockers, equipment room, and miscellaneous storage located in basement |
| | 12. Cashier | |

The work center is used for food preparation between meal periods. Additional tabletop workspace is obtained by placing composition cutting boards over the three-compartment pot and pan sink. The disposal (item 4) gets rid of food trimmings and waste from pots and pans. The additional single-compartment sink (item 8) is used for washing fruits and vegetables.

Items 3 through 7 identify the equipment generally used in a conventional pot and pan

washing work center. This pot and pan washing work center is similar to the one discussed in the section of this report entitled, "Occasion-Type Restaurant," page 31. Pots and pans are washed in this combination work center during meal periods.

Trimmed vegetables are pushed from the converted worktable (item 3), onto the salad and dessert preparation worktable (item 9). Most of the trimmed vegetables are used for salads.

Hot vegetables are generally prepared from frozen convenience products.

Chinaware is stacked on the undershelf of the preparation worktable (item 9). The mixer is used for chopping vegetables and for beating and grinding the various foods. Tossed salad mix in bulk and salads and desserts requiring plates are held in the reach-in refrigerator (item 12). Tossed salads are arranged in bowls and garnished in the dining room. These products are moved directly into temporary dining room storage through the two-way door adjacent to the wash basin (item 36). This material flow and production method greatly reduces walking requirements, backtracking, and cross-traffic conditions.

Meat preparation is the main task performed at the worktable (item 13) opposite the salad and dessert preparation worktable. Miscellaneous spices are stored on the overshelf. Most of the family-type restaurants participating in the study purchased a combination of portion-cut meat and primal cuts. Limited butchering tasks are performed on this worktable. The closed top range (item 16) is used for roasts and for cooking a limited number of soups and sauces. The slicer is used for cutting cold sandwich meats. The exhaust canopy (item 17) extends over the closed top range from the meat and vegetable cooking work center. Additional details concerning exhaust canopies can be found in the occasion-type restaurant section of his report under "Work Center Layouts."

Meat and vegetable cooking

The partly finished product from the combination preparation work center is placed in base cabinet refrigerators (items 23, 25, and 2). Some of the restaurateurs who participated in this study preferred sliding-drawer-type refrigerated base cabinets such as that shown in figure 37. The main advantage of this type of unit over the hinged-door type is that employees can remove batch quantities of partly finished product without having to kneel and reach into the refrigerator. This feature reduces employee fatigue and time requirements.

The main cooking battery consists of a microwave oven (item 19 in figure 35), four deep fat fryers (item 20), a griddle (item 21), and an

open top broiler (item 22). A full-length wooden cutting board (item 18) has been secured to the front edge of these cooking units to provide a landing space for plates and for the finished product. The steamer (item 24) is used for cooking small-batch quantities of frozen vegetables.

The open top burner (item 29), the griddle (item 31), and the waffle grill (item 33) are used for preparing breakfast orders of eggs, pancakes, and waffles. The griddle is also used for cooking meat orders for the lunch and dinner menu. A wooden cutting board provides a landing space. Hot food is stored in the four wells (item 28). Clean chinaware is stored on undershelves beneath the hot food wells and the griddle.

Cold sandwiches are prepared on the base cabinet refrigerator (item 25). A small overshelf has been provided for bowl storage for special salads. A typical cold sandwich makeup table is shown in figure 38.

Finished production of both hot food and cold sandwiches is moved to the customer by means of either the pass-through window (item 34 in figure 35) or the waiter's pickup counter (item 39).

Customer takeout counter and waiter's stations

Processed food for off-premise consumption is received from the kitchen through a pass-through window (item 34) at the customer takeout back counter (item 43). Paper wrapping supplies are stored on undershelving. The reach-in refrigerator (item 42) adjacent to the takeout counter is used for holding fruit and cream pies. Ice cream desserts and soft drinks are obtained at the fountain (item 44).

The beverage center is located opposite the fountain. Paper products for takeout beverages are stored on undershelving. This station is also used by waiters and waitresses to obtain beverages for customers at nearby tables. The ice bin (item 53) is conveniently stocked from the ice cube machine (item 37) located in the kitchen. Orders are received by the customer at the customer takeout front counter (item 55).

The waiter's station, which is centrally located in the dining area in this family-type restaurant, is similar to the waiter's station in an

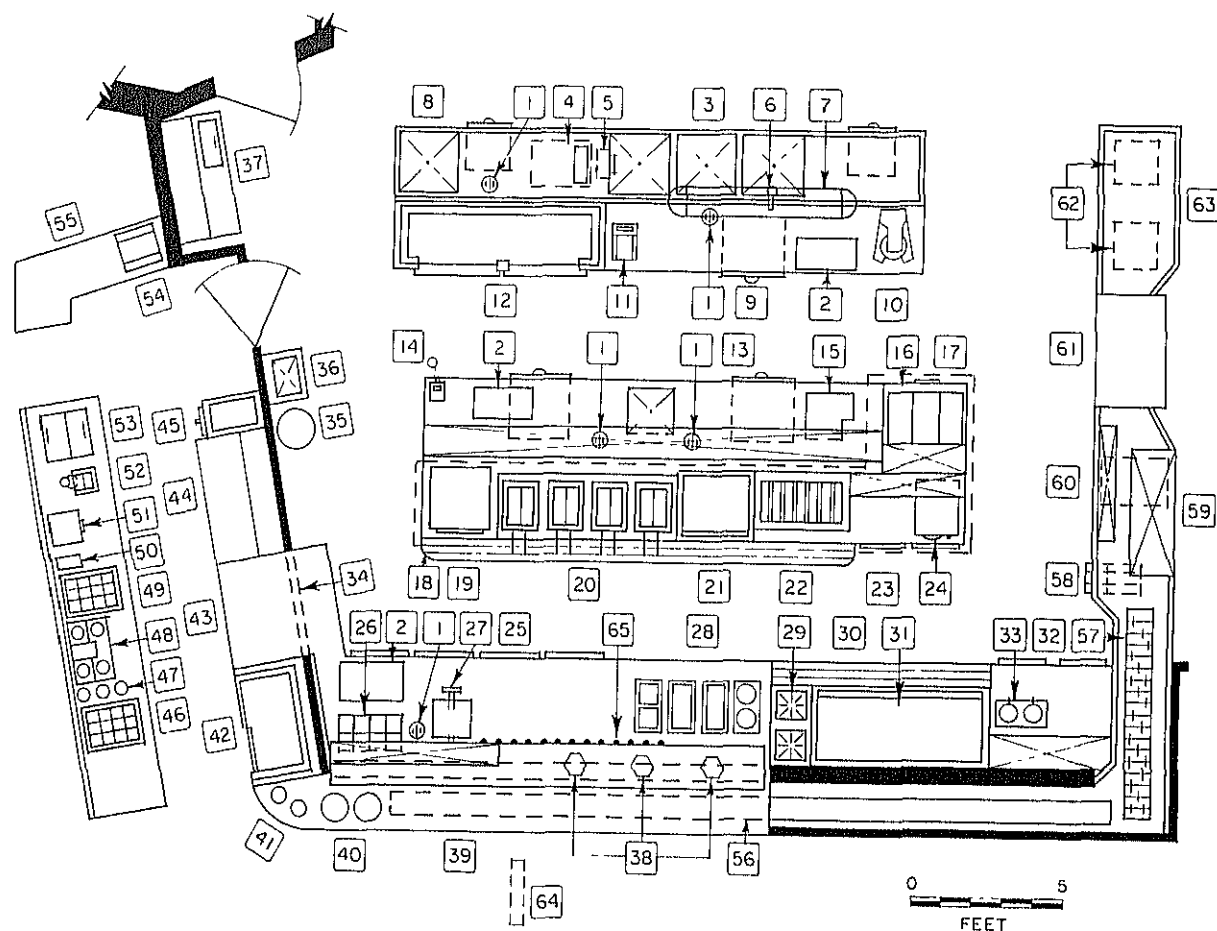


FIGURE 35.—Layout for kitchen in family-type restaurant.

Equipment schedule

- | | | |
|--|---|---|
| 1. Knife wells (5) | 13. Stainless steel meat and vegetable preparation worktable with single-compartment sink, drawers (2), overshef, and undershef | 28. Hot food wells (4) and under counter dish storage |
| 2. Composition cutting boards (3) | 14. Can opener | 29. Open top burners (2) |
| 3. Stainless steel combination pot and pan washing table with three-compartment sink and meat and vegetable preparation table with drawers (2) | 15. Slicer | 30. Wood cutting board |
| 4. Disposal (3 h.p., hammermill type) | 16. Closed top range | 31. Griddle |
| 5. Recirculating centrifugal pump | 17. Exhaust canopy | 32. Base cabinet refrigerator |
| 6. Flexible spray rinse arm | 18. Wood cutting board | 33. Waffle grill |
| 7. Overhead pot rack | 19. Microwave oven | 34. Pass-through window |
| 8. Single-compartment sink | 20. Deep fat fryers (4) | 35. Trash can |
| 9. Stainless steel salad preparation worktable with undershef | 21. Griddle | 36. Wash basin |
| 10. 12-quart mixer on mobile stand | 22. Open top broiler | 37. Ice machine |
| 11. Portion scale | 23. Base cabinet refrigerator with overshef | 38. Heat lamps (3) |
| 12. Reach-in refrigerator | 24. Steamer | 39. Waiter's pickup counter |
| | 25. Base cabinet refrigerator | 40. Soup wells (2) |
| | 26. Cold food wells (8) | 41. Soup bowl lowerators (2) |
| | 27. Sandwich grill | 42. Reach-in refrigerator, sliding-door type |
| | | 43. Customer takeout back counter |
| | | 44. Fountain |
| | | 45. Milkshake machine |

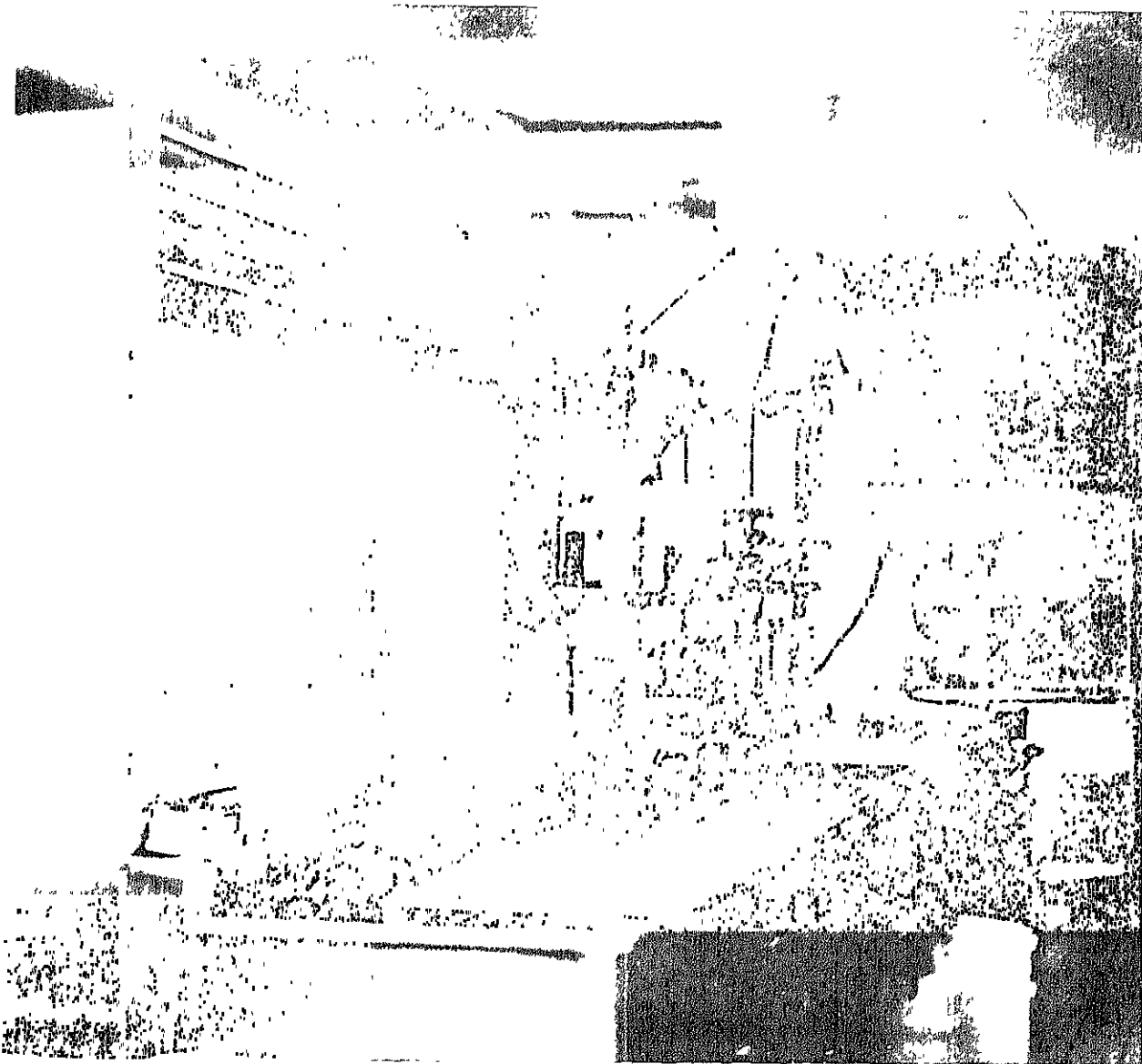


FIGURE 36.—Combination work center.

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FIGURE 35.—Continued

Equipment schedule—Continued

- | | | |
|---------------------------|--|--|
| 46. Cup rack lowerator | 53. Ice bin | 59. Glass rack overshef and soiled dish table |
| 47. Saucer lowerator | 54. Cash register | 60. Scrap chute and disposal (3 h.p., hammermill type) |
| 48. Coffee maker | 55. Customer takeout front counter | 61. Dish machine |
| 49. Glass rack lowerator | 56. Soiled dish conveyor (belt type) | 62. Clean dish dollies |
| 50. Tea dispenser | 57. Soiled dish conveyor (skate-wheel type) | 63. Clean dish table |
| 51. Milk dispenser | 58. Three-compartment soak tank and silverware chute | 64. Call lamp board |
| 52. Water dispensing head | | 65. Guest check clips |



BN-37608

FIGURE 37.—Sliding-drawer-type refrigerated base cabinet.

occasion-type restaurant but is exposed to the view of the general public. The primary advantage of having this station "open" to the general public is that customers can serve themselves a second cup of coffee. Figure 39 shows a view of part of one of the better designed waiter's stations in a restaurant that participated in this study. Soiled tableware is stored temporarily in plastic bus boxes on undershelves beneath the silverware cylinders. Space is provided adjacent to the bus boxes for storing condiments. Coffee is made in small quantities to insure quality.

One of the main features of this station is the shelving at one end, sized for the storage of

glass racks. The primary advantage of this design is handling ease. When the supply of clean glasses in the top rack is gone, the rack is removed and replaced with a loaded rack from a bottom shelf. The empty rack is then placed in the vacant lower shelf. Advantages of this design over the spring-loaded type of storage are that it is less expensive, can be easily cleaned, and requires very little maintenance. A conventional lowerator (spring-loaded) type of dispenser can be used for saucer storage.

Figure 40 shows a refrigerated base cabinet that is another waiter's station in the dining room. The top of this cabinet is used to plate tossed salads. The tossed salad mixture is made

in the salad preparation area located in the kitchen. The design of this waiter's station greatly reduces the time required to plate tossed salads. The standard method of plating tossed salads is as follows: Hold a bowl in the right hand and a No. 4, 7-inch liner plate in the left hand. Dip the bowl into the salad mix, fill it, place it on the liner plate in the left hand. Place the right hand on the dispenser plunger with the left hand position the bowl beneath the dispensing arm. Depress the dispensing arm to place dressing on the salad mixture. The design of this station and its location in the dining room eliminates the need for employees to walk to the kitchen and enables them to fill customer orders efficiently and quickly.

Waiter's pickup counter

One of the latest trends noted in family-type restaurants is exposing the main cooking battery and the waiter's pickup counter to the view of the general public. This arrangement is desirable from a merchandising aspect because the customer can see various food items being prepared at a sanitary work area. In addition, waiters are motivated to pick up plated orders promptly because the customer may see when his order is ready. This design concept is shown in figure 41.

Item 39 in figure 35 indicates the location of the waiter's pickup counter. Waiters or bus-boys bring bus boxes containing soiled dishes from the waiter's station in the dining room

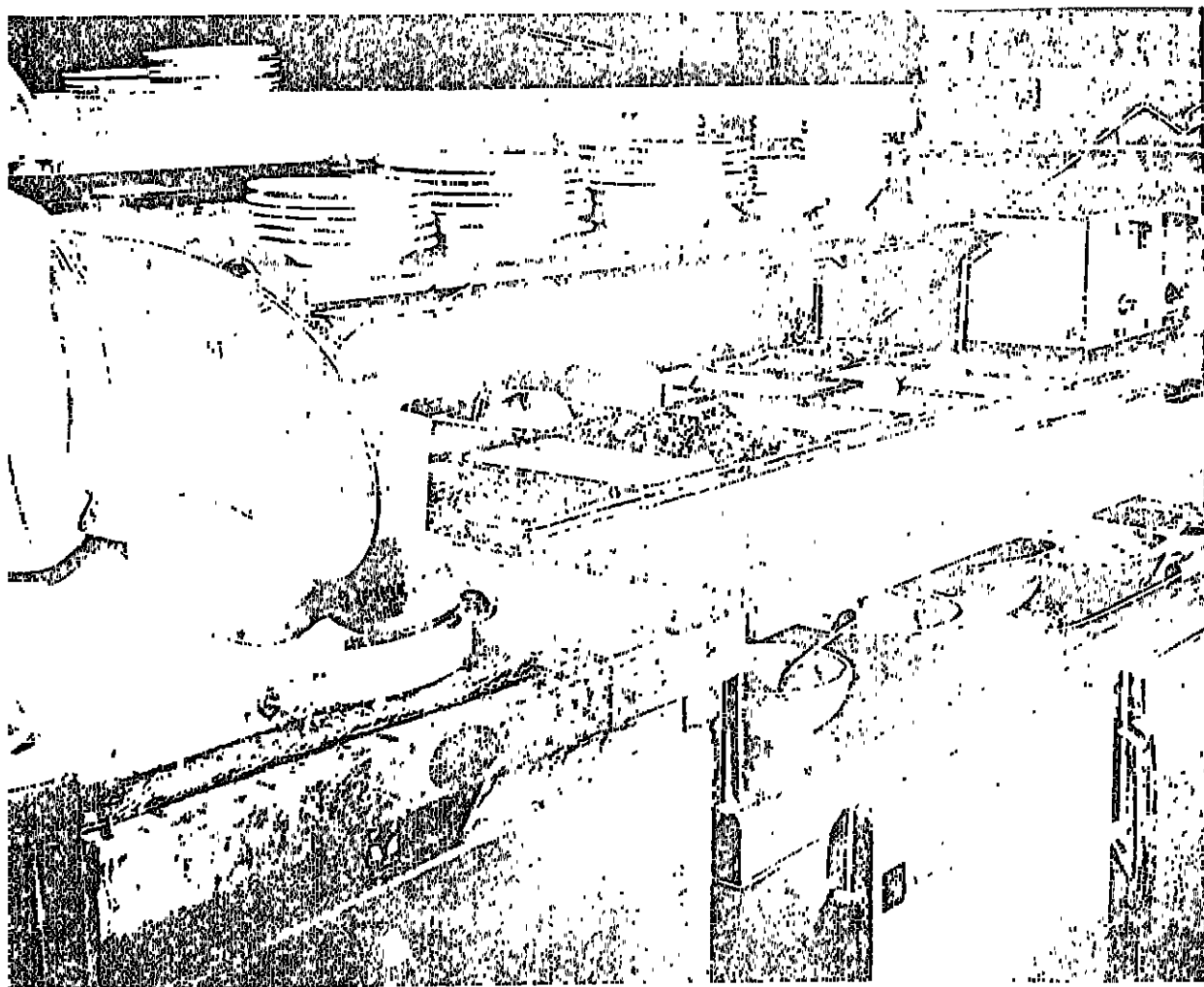
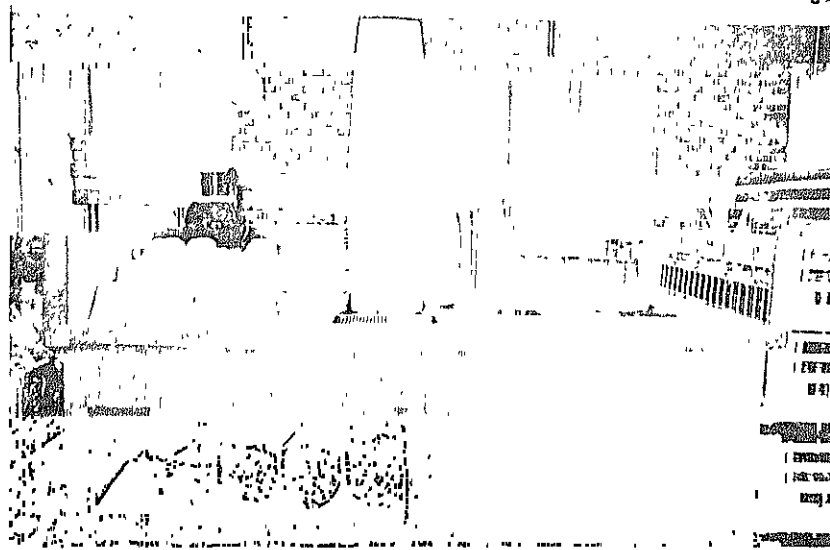


FIGURE 38.—Sandwich makeup table.

BN-37800



PN-2311

FIGURE 39.—Waiter's station.

and place them on the soiled dish conveyor (item 56), usually at the same time that an original order is placed in the kitchen or a plated order is to be picked up for delivery to the customer. A duplicate copy of the guest check is filed with the cook. The check is placed beneath a clip (item 65) while the order is being "worked" or processed in the kitchen. When the plated order is ready for delivery to the customer, the duplicate copy of the check is removed from the clip and placed beneath the order in the pass-through window. The cook notifies a specific waiter that an order is ready by activating his call number on the call lamp board (item 64). Hot food orders are picked up from beneath the heat lamp (item 38) and cold food orders from the counter area opposite the cold sandwich makeup table.

Dishroom

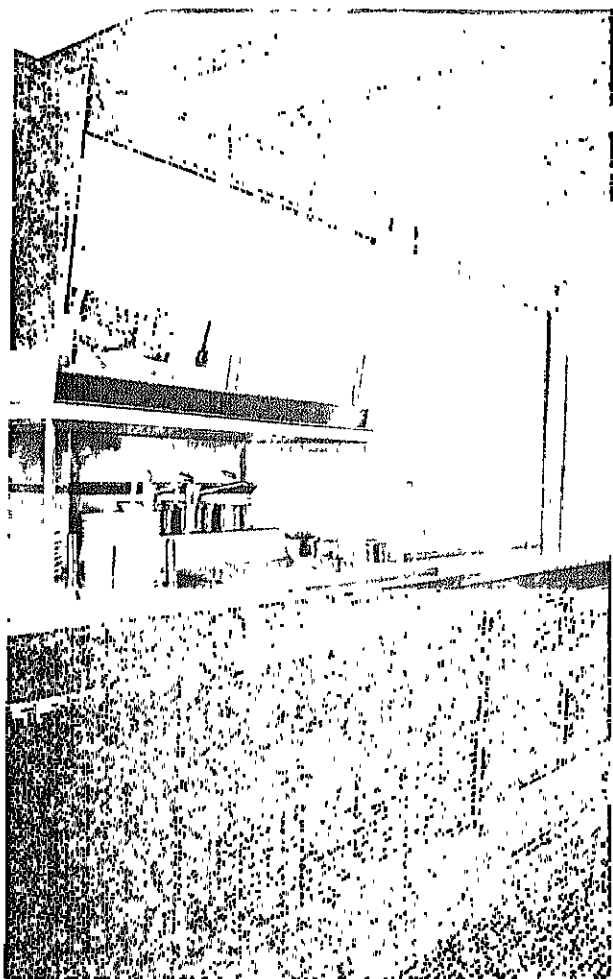
The dishroom shown in figure 35 facilitates the straight-line flow of soiled dishes from the belt conveyor (item 56) through the dish machine (item 61) to the clean dish table (item 63). Soiled dishes in bus boxes are pushed onto the skate-wheel conveyor (item 57) by the powered-belt conveyor. Bus boxes move by gravity on the inclined skate-wheel conveyor to

the soiled dish table. Soiled glasses are racked in the glass rack oversheaf (item 59), silverware is placed in the soak tank (item 58), and trash is placed in the disposal (item 60). Soiled dishes are sorted by type and placed in stacks on the soiled dish table. Soiled tableware is then placed in appropriate dish machine racks before washing. Clean tableware is transferred from the clean dish table onto dollies (item 62).

Equipment Selection

The selection of food preparation equipment should be closely related to the type, number, and variety of menu items that are to be produced and served. Consideration should be given to the quantity of foods that are to be purchased and the types—fresh and raw, partly processed, frozen, customer portioned, or fully processed (convenience foods).

The equipment needed to store, prepare, cook, hold, and serve each menu item should be determined. Consider the sequence of operations and the various processes that are required to produce and serve each menu item. The equipment for work centers should be geared to the efficient functioning of the restaurant as an integrated system. The individual work centers must then



PN-2312

FIGURE 40.—Walter's station—salad plating.

The use of new convenience foods requires detailed planning if good operating results are to be expected. Technological advances in preparation equipment should be used in the reconstitution of convenience foods. Compact, customer portioned, partly prepared, frozen, or dehydrated instant foods often require specialized equipment for handling and storage.

Today, trends in restaurant equipment center around layouts and equipment that reduce travel requirements. These trends include:

- (1) Greater use of pass-throughs for foods.
- (2) Increased use of food-warming devices, including holding cabinets and infrared lamps.
- (3) Greater use of small-batch cooking equipment, such as pressure cookers, to insure taste and freshness of vegetables and to reduce waste.
- (4) More use of reach-in and base cabinet refrigerators at work centers.
- (5) Increased freezer capacity to provide necessary storage for frozen vegetables, meats, and convenience foods and to permit some leveling of the production load through preparation well ahead of intended use.
- (6) Greater use of mobile equipment.
- (7) Greater use of concealed soiled dish conveyors between the dining room and dishroom.

Alternative choices of equipment should be carefully evaluated for their potential reduction of labor requirements. Annual labor savings often offset the increased cost of more efficient equipment. The trend toward fewer, more highly paid, skilled employees should be considered in the selection of this equipment.

Sanitation

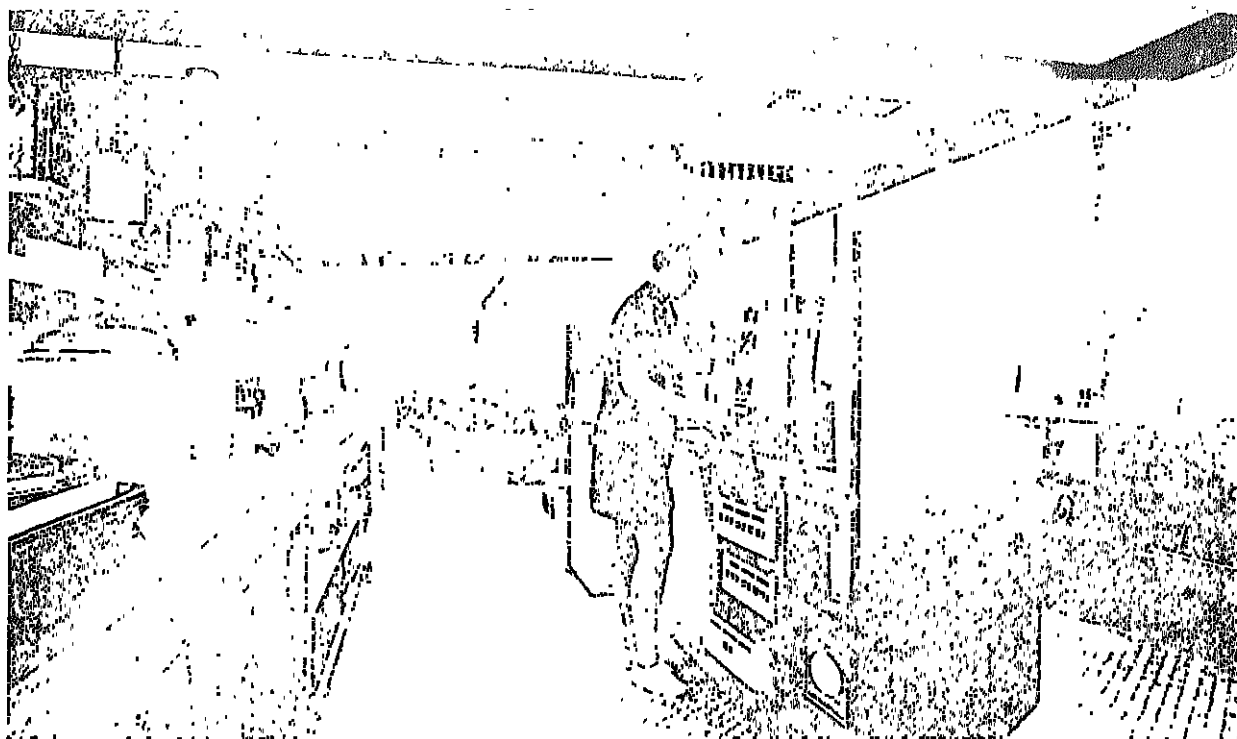
Many food service management personnel devote only enough attention to the sanitation problem to comply with local government health codes. Unfortunately, they also usually believe that the regular inspections provide them with enough policing to make their operations very sanitary. However, in many instances these regular inspections are superficial. In some instances they are only a formality, consisting of merely viewing an operation in order to fill in a checklist. This checklist makes no provisions for the individual operation and usually is very general in nature so that it can easily apply to all operations.

If a regular inspection is determined to be complete and thorough, however, one may con-

be related to minimize walking distances and cross traffic by achieving good patterns of circulation. Therefore, the following should be considered in the selection of equipment:

- (1) Amount of floorspace in the work area.
- (2) Method of operating and controlling work area.
- (3) Cost and availability of equipment and utilities.
- (4) Availability of personnel to operate the equipment.
- (5) Adaptability to menu requirements.
- (6) Capacity to meet peak production load requirements.
- (7) Availability of maintenance service.
- (8) Reliability and simplicity of operation.

Adaptability of equipment is becoming increasingly important as a result of changing technology in food preparation and marketing.



PN-2313

FIGURE 41.—Waiter's pickup counter.

sider the inspector's findings to be valid. The use of such findings as a partial guideline for proper sanitation can frequently save time and money.

There are five basic criteria by which to determine the thoroughness and validity of a regular governmental inspection:³

(1) The length of time an inspector spends on the inspection is significant. If he spends less than one-half hour, the inspection is usually very superficial. If he spends from 3 to 8 hours, depending on the size of the operation, then the inspection can be valid.

(2) If the inspector changes from street clothes to a work uniform, the chances of a good inspection are increased. He should appear considerably soiled after the inspection.

(3) The inspector should take some equipment apart during the inspection. It is unlikely that every piece of equipment would appear, by its exterior appearance alone, to need no internal inspection.

(4) The inspector should use an ultraviolet lamp to search thoroughly for vermin and bacteria.

(5) The inspector should climb and crawl into every available space that might be unsanitary.

³HUGO, T. L. IS YOUR SANITATION SHAKY? Food Engineering, p. 122, April 1969.

If the inspector is motivated enough to satisfy all five criteria, then the operator has good reason to assume that the inspection was valid and thorough.

If the inspection does not satisfy all of the above criteria, the operator should set and follow his own standards. There are two basic reasons for this sanitation program. First, the food service operator is morally obliged to insure that the products sold to the consumer have been cared for in the best possible manner to prevent the transmission of disease or illness. In some instances the top executives may be criminally responsible if extremely unsanitary conditions are discovered. Second, sanitation is economical: Stored products last longer; items undergo fewer detrimental changes; and unsanitary conditions may nauseate customers and result in lost business to such an extent that the operation may fail.

Preventive maintenance must be designed not only to meet inspection requirements but also to anticipate all possible unsanitary conditions. Even if an operator has a program of

sanitation, he must constantly reevaluate and examine it objectively to avoid overconfidence in the quality of the program, which could cause possible negligence. Reliance upon one method or process to solve all of one's sanitation problems will encourage a false sense of security. This reliance holds true even after the valid regular inspections previously mentioned. The valid inspection program itself must be regularly reevaluated, because inspectors and health policies sometimes change with promotions and actions.

Rodents of any type can cause vast amounts of damage. Stores of goods, along with their containers, can become useless. The sight of a rodent in the customer's eating area could be very harmful. A good rodent-prevention program will include correct rodent proofing, proper cleaning practices, and a regular poisoning program if the operation's environment is infested with rodents. Rodent proofing should be planned for in the construction of the facility. If a problem does occur because of poor rodent proofing, an outside firm usually has to be called in to install nonporous metal or ceramic seaboards and other fixtures, such as screens attached to the removable top grate over drainpipes, to keep rodents from entering through cracks or drains. Rodents should not be poisoned in processing areas, only trapped. If a rodent problem is discovered, a program of heavy poisoning should be undertaken, especially in garbage areas and around the periphery of the operation. Rodents can be poisoned in storage areas but bait boxes must be clearly marked to avoid possible mixture with food items.

Crawling insects, especially beetles and cockroaches, can pose great storage and sanitation problems. Cockroaches are attracted especially to exposed food. All types attack stored goods. Cockroaches not only can damage stored products but also can carry bacteria from place to place. When these insects are in one area of an operation, they can very easily travel into the dining room where they may be seen by the customers or may even crawl on them or their food. One of the best ways to control crawling insects is with commercial insecticides, which can be applied with a brush and which leave a chemical coating that retains killing effects.

These applications must be applied regularly. Spraying is recommended as a necessary complement to brush applications.

Flying insects, such as gnats, fruitflies, and houseflies, usually breed around areas of exposed food. They are unsightly and annoying and transport bacteria. The use of larvacides and insecticides must be implemented to alleviate an existing problem and prevent a future one. The problem of fruitflies can be avoided by proper disposal of all fruits and vegetables. Fruitflies around exposed fruit for bar use can best be controlled by getting rid of any fruit that has been exposed. The cost of the fruit is small compared to the possible loss of business. The fruit trays should be run through the dishwashing machine daily. The area of the bar where fruit is kept should be washed when the restaurant closes in the evening.

The above-mentioned specific problems are but a few of the many that may be encountered in an unsanitary situation. The old adage, "Prevention is better than cure," holds true for achieving proper sanitary conditions in an operation.

The "soap and water" method is still the basic step in proper sanitation. Regular cleaning of all areas in the operation will prevent a buildup of dirt, vermin, and bacteria. Food waste and soiled dishes should not be left in the kitchen area overnight. Ceilings and overhead corners must be cleaned. These procedures, followed regularly, will give maximum beneficial results.

The construction of the equipment should be oriented toward ease and efficiency of cleaning. All corners on equipment should be rounded to comply with the National Sanitation Foundation Standards⁴ to insure cleaning ease and to prevent undesirable accumulations.

Sanitation must also be kept in mind in the installation of permanent equipment. Permanent fixtures must have their bases sealed to the floors and walls, or be mounted on islands constructed of ceramic tile.

Mobile cooking equipment with quick disconnect gasline fittings can be obtained. The advantages of using mobile equipment are ease

⁴ Additional information can be obtained from the National Sanitation Foundation, School of Public Health, Univ. of Michigan, Ann Arbor, Mich. 48104.

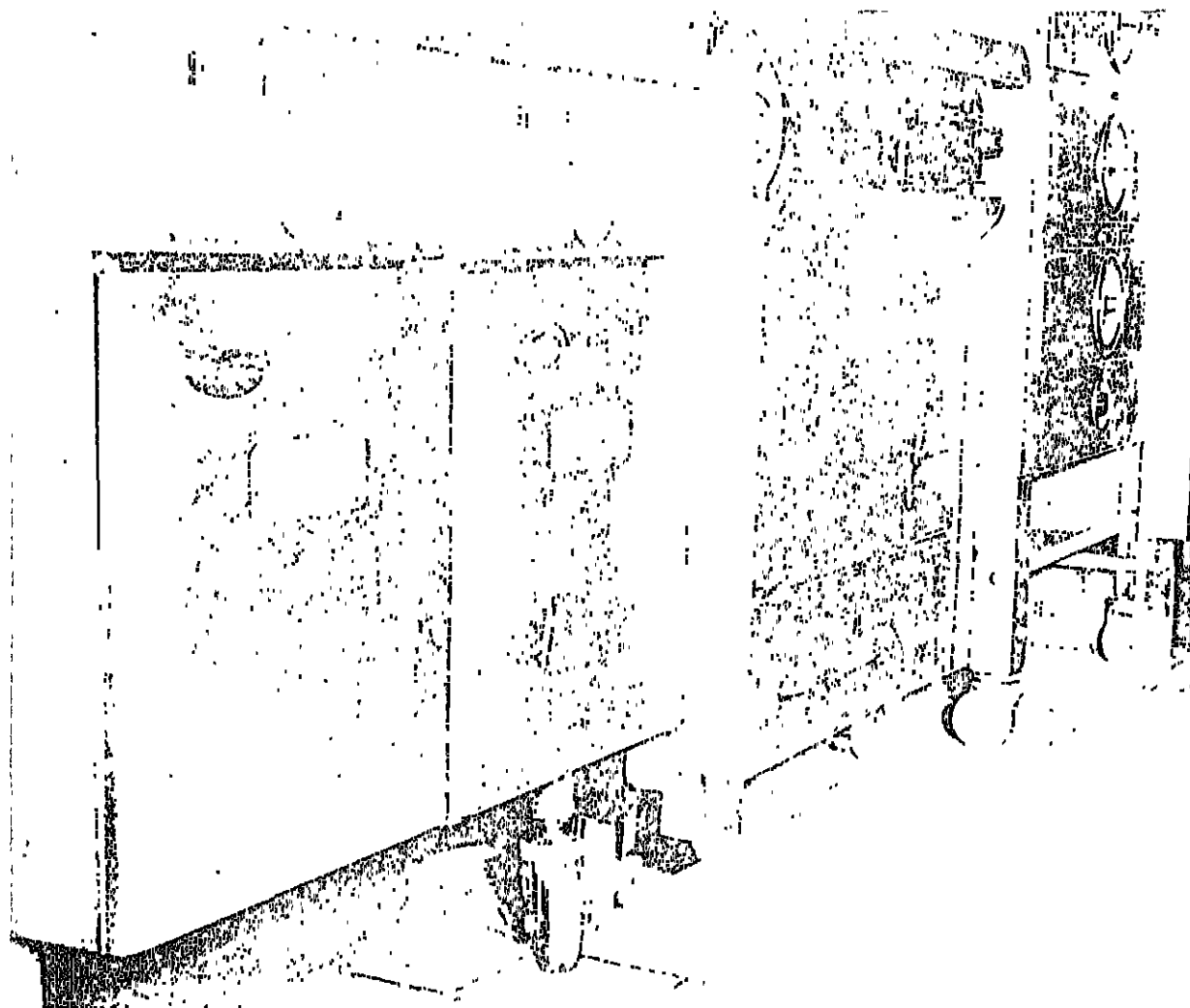


FIGURE 42.—Mobile cooking equipment.

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of cleaning walls, floors, and corners, and versatility in equipment arrangement in case of menu change or desire to improve workflow. An illustration of mobile equipment is shown in figure 42. Containers should not touch the floor. Containers should be placed on dolly bases that can be easily separated for cleaning.

Finally, management must adopt and convey to employees the proper attitude regarding

sanitation. Sanitation must not be taken for granted. Employees must be constantly reminded of the importance of sanitation; supervisory personnel should be formally trained in how to teach and inspire the practice of proper sanitation. Getting the employees to consider everything from the viewpoint of sanitation, as well as of safety, is not easy but must be a goal of management.

EMPLOYEE SELECTION, MOTIVATION, AND TRAINING

Increasing wage pressure, combined with a shortage of trained workers, has made it increasingly necessary for food service operators

to develop effective programs and procedures for selecting, motivating, and training employees.

Employee Selection

During the job interview, the employer should review the job description with the applicant to insure that he understands all phases of the job. The employer should explain the working conditions under which the applicant will be required to produce, the relation of the job to others, the job or work tasks that might need to be combined with other job categories, and the qualifications that must be met for promotion to the next higher job category. The employer should also tell the applicant the hourly wage rate, working days and off days, fringe benefits, and disciplinary policy. During the discussion, the employer should determine the applicant's interest in the job and his need for further training. After the interview, the applicant should be taken on a tour of the facility.

Employee Motivation and Training

The effect of proper motivation, or the lack of it, is felt throughout every area of an operation. The best equipment and layouts will be of little value unless employees are properly motivated. A poorly motivated employee can make the most expensive piece of equipment even more expensive by poor work habits and can destroy the value of proper planning and equipment layout.

One method of measuring motivation is by turnover rate because lack of motivation most obviously expresses itself in high turnover rates. This method is not foolproof because employees who are not motivated may not always leave or be separated from their positions. However, the turnover rate is the best indicator readily available to us.

Employee turnover represents many costs that are not apparent, for example, hiring and training. Advertising, interviewing, medical examinations, training, and reduced productivity are typical expenses. These expenses are usually incurred each time an employee has to be replaced. In this study, as shown in tables 1 and 2, employee turnover in family-type restaurants averaged 13 percent per month and in occasion-type restaurants, 9 percent per month.

The U.S. Department of Labor estimates the cost of turnover per separated worker to be about \$232.18.⁵ In an operation with 35 employees, 13-percent turnover per month can represent \$12,677 per year in hidden or non-apparent costs.⁶

In anticipation of a continuing high turnover rate, many employers may be reluctant to train their personnel as well as they could, thinking it to be a "waste of time" because they feel that the employee will probably quit or be fired in a short time. As a result, this reluctance to train causes a lack of interest on the part of the employee. Then the so-called "vicious circle" tends to result. The more an employer feels his employees will be with him for only a short period, the less interest he takes in them. Employees in turn are not motivated by the employer's indifference, and the chances of separation are increased. Consequently, the more separations occur, the worse the employer's attitude becomes.

The food service industry should concentrate more of its resources and conduct additional research on solving the problems of poor motivation and, consequently, high turnover costs. Individual firms may reduce high turnover costs by better training of both managers and employees. Extensive and comprehensive training should be conducted because this problem of high turnover most likely will increase rather than decrease, as a result of an expanding industry and personnel shortages.

One innovation in training is the use of text materials that give the employee information and self-training for his job. The employee is usually tested on this material.

A formal training program is useful for training employees to handle more than one job category. Increased employee competence permits job combination, greater scheduling flexibility, and more effective control of employee productivity.

⁵ U.S. BUREAU OF EMPLOYMENT SECURITY. SUGGESTIONS FOR CONTROL OF TURNOVER AND ABSENTEEISM. U.S. Dept. of Labor Bureau Employment Security BES-E-61.

⁶ 13% per month \times 12 months = 156 percent per year.
35 employees \times 156 percent per yr. = 54.6 turnovers.
54.6 turnovers \times \$232.18 per turnover = \$12,677.

APPENDIX

Exhibit A— Method of Determining Productive Man-Hour Requirements

Work sampling was used in developing man-hour requirements for production operations. The work sampling procedure is, in brief, the qualitative observations of specific activities classified by the type of work. Observations are taken during time periods that are randomly selected.

The total observations for a specific activity such as "washing pots and pans" are divided by total observations for the particular job, in this case warewashing, and expressed as a percentage. This percentage is defined as the "actual work percentage." The productive work percentage is then computed from the actual work percentage through the application of performance rating and personal and fatigue allowance factors. The productive work percentage is the current level of labor utilization in the restaurant.

The final step in the procedure is the recapitulation of man-hours worked in each department and the number of customers served for the period during which the work sampling study was conducted. Productive man-hours per 100 customers served are then calculated.

The specific steps or procedures used in the development of these man-hour standards were as follows:

- (1) Classification of the various types of work.
- (2) Division of the types of work into activities.
- (3) Estimation of the number of observations required to provide a 10-percent tolerance at 2 sigma or 2 standard error level.
- (4) Selection of the observation route and observation points.
- (5) Determination of the random observation time.
- (6) Observation of the operation and tabulation of data for each activity by the various types of work.
- (7) Rating the output performances of the personnel.
- (8) Determination of personal and fatigue allowances.
- (9) Determination of the actual man-hours worked and the number of customers served during the work sampling study.
- (10) Calculation of the productive time.

A brief description of the work performed in each department is presented in Exhibit B. The activities that were observed are defined in Exhibit C.

Exhibit B— Descriptions of Table Service Restaurant Departments by Type of Work Performed

Direct Labor:

Meat and vegetable	Preparing and cooking meat, fish, poultry, and vegetables. Employees include butchers, fry cooks, broiler men, short order cooks, and similar classifications of cooks and cook's helpers.
Salad -----	Preparing salads, juices, and appetizers. Employees include salad and pantry girls, who may also prepare sandwiches.
Warewashing - - -	Washing tableware, trays, pots, and pans; and wrapping silverware.
Customer service -	Taking orders from customers; serving prepared food items; removing soiled dishes, silverware, glasses, and other soiled table appointments from the tables and transporting them to the dishroom; and resetting tables. Employees occasionally assist in general housekeeping.
Bar	Serving alcoholic beverages to customers or waiters; and collecting cash.

Indirect Labor:

Managers - - - - -	Supervising and training employees. Managers may occasionally assist in direct production of food items.
Storeroom attendants.	Receiving and issuing raw material.
Cashiers -----	Receiving meal checks from customers or waiters; and collecting cash.
Housekeepers and repairmen.	Housekeeping activities and repairing equipment. Housekeeping activities are generally performed after the restaurant has closed for the day.

**Exhibit C—
Descriptions of Observed Activities
of Direct Labor Employees**

- | | |
|---|--|
| <p>(1) Preparing meat and vegetables. Butchers, meat cooks, vegetable cooks, and assistants preparing meat and vegetable products before cooking. This activity includes such productive time as washing, trimming, and portioning raw meat and vegetable products.</p> <p>(2) Cooking ----- Meat cooks, vegetable cooks, and assistants cooking meat and vegetable products. This activity includes such productive time as giving attention to the cooking process.</p> <p>(3) Filling orders --- Cooks and steamtable employees receiving and filling food orders for waiters and waitresses.</p> <p>(4) Cleaning stations. Kitchen employees cleaning worktables and equipment.</p> <p>(5) Walking loaded Employees transporting food products, tableware, and miscellaneous items.</p> <p>(6) Walking empty Employees walking without a load.</p> <p>(7) Miscellaneous work. Employees performing such activities as sharpening knives and receiving management instruction; or performing work that is foreign to a specific job, such as a saladmaker cooking meats.</p> <p>(8) Unavoidable delay. Employees delayed in performing their normal duties by the activities of others.</p> <p>(9) Nonproductive --- Employees not engaged in productive work (not delayed by the activities of others).</p> <p>(10) Preparing salads. Saladmakers washing and trimming raw salad products and preparing custards and congealed salad items.</p> <p>(11) Assembling salads. Saladmakers assembling salads on plates and garnishing them.</p> <p>(12) Washing dishes Dishroom employees washing dishes. This activity includes such productive time as disposing of garbage, sorting soiled and clean dishware, and charging the dish machine.</p> <p>(13) Washing pots and pans. Employees washing pots and pans and miscellaneous cooking utensils. This activity includes such productive time as filling sinks with water and disposing of garbage.</p> | <p>(14) Wrapping silver Warewashing employees wrapping silverware in a napkin. This activity includes such productive time as sorting clean silver and stacking wrapped silver.</p> <p>(15) Cleaning kitchen. Warewashing and utility employees performing general cleanup of the kitchen. This activity includes such productive time as washing walls, mopping floors, and cleaning exhaust filters.</p> <p>(16) Cleaning dining room. Warewashing and utility employees performing general cleanup of the dining area. This activity includes such productive time as washing windows and walls, mopping and waxing floors in dining room and customer lounges, and cleaning decorative fixtures.</p> <p>(17) Serving customers. Waiters, waitresses, and busboys receiving food orders from customers, placing food orders on the table, totaling the food check, and receiving payment for the check.</p> <p>(18) Clearing tables Waiters, waitresses, and busboys removing soiled dishware items from the table. This activity includes such productive time as cleaning the table with a damp cloth and removing soiled table covers or place mats.</p> <p>(19) Setting up tables. Waiters, waitresses, and busboys filling condiment containers and cleaning tables and chairs before or after the meal period. This activity occurs only when the dining room is closed to the general public.</p> <p>(20) Picking up orders. Waiters and waitresses in the kitchen or bar placing and receiving food or beverage orders.</p> <p>(21) Making change Bartender making change at the cashbox for either customers or waiters.</p> <p>(22) Washing glasses Bartender washing and polishing glassware at the bar.</p> <p>(23) Clearing bar Bartender removing soiled glassware from the bar and wiping the bar top with a damp cloth.</p> <p>(24) Filling beverage orders. Bartender filling beverage orders for customers or waiters. This activity includes such productive work as receiving oral or written orders for beverages.</p> |
|---|--|

TABLE 10.—*Productive and actual restaurant employee man-hours per 100 customers served in 6 family-type restaurants studied*

Department and activity	Restaurant A				Restaurant B				Restaurant C				Restaurant D			
	Productive time per 100 customers	Actual time per 100 customers	Per-formance index	Percent	Productive time per 100 customers	Actual time per 100 customers	Per-formance index	Percent	Productive time per 100 customers	Actual time per 100 customers	Per-formance index	Percent	Productive time per 100 customers	Actual time per 100 customers	Per-formance index	Percent
DIRECT LABOR																
Meat and vegetable:																
Preparing meat and vegetables	71	77	92.2	100.0	65	63	103.2	98.4	49	54	90.7	98.4	54	59	91.5	98.4
Cooking	47	49	95.9	93.4	37	38	97.4	95.9	1.77	1.77	97.5	97.5	1.77	1.77	97.5	97.5
Filling orders	77	83	93.4	88.3	83	94	88.3	88.3	1.00	1.09	91.7	91.7	1.10	1.22	90.2	90.2
Cleaning stations	21	22	95.5	88.9	08	09	88.9	88.9	09	09	100.0	100.0	09	10	90.4	90.4
Walking loaded	23	25	92.0	92.9	13	14	92.9	92.9	26	29	89.7	89.7	22	24	91.7	91.7
Walking empty	08	09	88.9	93.3	14	15	93.3	93.3	39	44	88.6	88.6	30	34	88.2	88.2
Miscellaneous work	20	22	90.9	100.0	10	12	83.3	83.3	31	33	93.9	93.9	30	36	83.3	83.3
Unavoidable delay	01	01	100.0	100.0	01	01	100.0	100.0	02	02	100.0	100.0	02	02	100.0	100.0
Nonproductive	24	24	100.0	100.0	01	01	100.0	100.0	02	02	100.0	100.0	02	02	100.0	100.0
Total (or average) meat and vegetable preparation	2.68	3.14	85.4	69.7	1.91	2.74	85.4	69.7	3.33	3.87	86.0	86.0	3.55	4.43	80.1	80.1
Salads:																
Preparing salads	43	50	86.0	84.2	16	19	84.2	84.2	21	24	87.5	87.5	21	24	87.5	87.5
Assembling salads	77	80	95.0	95.2	20	21	95.2	95.2	66	71	92.9	92.9	66	71	92.9	92.9
Cleaning stations	12	13	92.3	80.0	05	05	80.0	80.0	11	12	91.7	91.7	11	12	91.7	91.7
Walking loaded	10	12	83.3	84.6	11	13	84.6	84.6	03	04	75.0	75.0	03	04	75.0	75.0
Walking empty	09	11	81.8	88.9	08	09	88.9	88.9	10	11	90.9	90.9	10	11	90.9	90.9
Miscellaneous work	17	20	85.0	83.3	05	06	83.3	83.3	10	11	90.9	90.9	10	11	90.9	90.9
Unavoidable delay	01	01	100.0	100.0	01	01	100.0	100.0	01	01	100.0	100.0	01	01	100.0	100.0
Nonproductive	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total (or average) salad preparation	1.68	2.09	80.4	78.3	.65	.83	78.3	78.3	1.16	1.33	87.2	87.2	..	..	..	..
Warewashing:																
Washing dishes	1.42	1.63	87.1	87.9	1.46	1.66	87.9	87.9	1.78	1.98	89.9	89.9	1.05	1.20	87.5	87.5
Washing pots and pans	.25	.29	86.2	87.9	.29	.33	87.9	87.9	.63	.70	90.0	90.0	.31	.34	91.2	91.2
Wrapping silver	.09	.10	90.0	80.0	.05	.05	80.0	80.0	..	..	..	..	..	..	..	..
Cleaning stations	.06	.07	85.7	82.7	.04	.05	82.7	82.7	..	..	..	..	..	..	..	..
Walking loaded	.55	.65	84.6	81.3	.24	.29	81.3	81.3	14	16	84.2	84.2	09	10	90.0	90.0
Walking empty	.26	.34	76.5	85.7	.26	.32	85.7	85.7	16	19	84.2	84.2	39	46	84.8	84.8
Cleaning kitchen	.07	.08	87.5	75.0	.30	.35	75.0	75.0	16	18	88.9	88.9	15	18	83.3	83.3
Cleaning dining room	.09	.12	75.0	86.7	.13	.15	86.7	86.7	26	30	86.7	86.7	15	18	83.3	83.3
Miscellaneous work	.20	.23	86.9	100.0	.01	.01	100.0	100.0	..	..	..	..	..	..	..	..
Unavoidable delay	.05	.05	100.0	100.0	.01	.01	100.0	100.0	..	..	..	..	..	..	..	..
Nonproductive	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total (or average) warewashing	3.04	4.07	74.7	71.5	2.73	3.82	71.5	71.5	3.26	4.20	77.6	77.6	2.44	3.17	77.0	77.0
Customer service:																
Walking loaded	1.28	1.46	87.7	86.7	2.08	2.40	86.7	86.7	2.79	2.95	94.6	94.6	1.04	1.21	86.0	86.0
Walking empty	1.23	1.47	83.7	82.2	1.62	1.97	82.2	82.2	2.02	2.35	86.0	86.0	1.41	1.72	82.0	82.0
Serving customers	2.95	3.35	88.1	86.2	2.11	2.48	86.2	86.2	2.01	2.33	90.1	90.1	1.42	1.64	86.6	86.6
Clearing tables	.45	.51	88.2	86.2	1.06	1.23	86.2	86.2	1.11	1.26	88.1	88.1	1.04	1.21	86.0	86.0
Setting up tables	15	18	83.3	80.0	04	05	80.0	80.0	19	22	86.4	86.4	02	02	100.0	100.0
Picking up orders	82	93	88.2	86.0	49	57	86.0	86.0	34	39	86.4	86.4	35	40	87.3	87.3
Miscellaneous work	1.84	2.10	87.6	86.0	2.40	2.79	86.0	86.0	3.43	3.83	90.3	90.3	2.49	2.88	85.6	85.6
Unavoidable delay	.77	.77	100.0	100.0	.26	.26	100.0	100.0	.45	.45	100.0	100.0	.22	.22	100.0	100.0
Nonproductive	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total (or average) customer service	9.49	11.96	79.3	77.0	10.06	13.06	77.0	77.0	12.24	14.80	86.8	86.8	6.63	8.62	76.9	76.9
Total (or average) direct labor	16.89	21.26	79.4	75.1	15.35	20.45	75.1	75.1	20.59	24.20	85.1	85.1	12.62	16.22	77.8	77.8

Department and activity	Restaurant E				Restaurant F				Average			
	Productive time per 100 customers ¹	Actual time per 100 customers	Per- formance index	Man-hours	Productive time per 100 customers ¹	Actual time per 100 customers	Per- formance index	Man-hours	Productive time per 100 customers ¹	Actual time per 100 customers	Per- formance index	Man-hours
DIRECT LABOR												
Meat and vegetable:												
Preparing meat and vegetables	72	87	82.7	53	62	85.5	85.5	51	57	89.5	89.5	57
Cooking	78	91	85.7	89	1.01	88.1	88.1	76	84	90.5	90.5	84
Filling orders	52	62	83.9	97	1.16	83.6	83.6	83	94	88.3	88.3	94
Cleaning stations	04	05	80.0	14	17	82.3	82.3	11	12	89.9	89.9	12
Walking loaded	43	52	82.7	16	19	84.2	84.2	24	27	88.9	88.9	27
Walking empty	43	54	79.6	27	34	79.4	79.4	27	32	84.4	84.4	32
Miscellaneous work	31	36	86.1	19	22	86.4	86.4	24	27	88.9	88.9	27
Unavoidable delay	03	03	100.0	01	01	100.0	100.0	02	02	100.0	100.0	02
Nonproductive	..	..	..	..	..	..	..	..	..	..	..	..
Total (or average) meat and vegetable preparation	3.26	4.49	72.6	3.16	4.42	71.5	71.5	2.98	3.85	77.4	77.4	3.85
Salads:												
Preparing salads	51	65	78.5	48	59	81.4	81.4	36	43	83.7	83.7	43
Assembling salads	31	38	81.6	26	32	81.3	81.3	44	52	84.6	84.6	52
Cleaning stations	04	05	80.0	14	16	87.5	87.5	08	09	88.9	88.9	09
Walking loaded	13	16	81.3	08	09	88.9	88.9	11	12	91.7	91.7	12
Walking empty	09	11	81.8	05	07	71.4	71.4	07	08	87.5	87.5	08
Miscellaneous work	09	11	81.8	06	07	85.7	85.7	09	11	88.9	88.9	11
Unavoidable delay	01	01	100.0	..	..	..	..	..	..	..	..	..
Nonproductive	..	..	..	..	..	..	..	..	..	..	..	..
Total (or average) salad preparation	1.18	1.59	74.2	1.07	1.37	78.1	78.1	1.15	1.44	79.9	79.9	1.44
Warewashing:												
Washing dishes	79	92	85.9	1.63	1.84	88.6	88.6	1.36	1.53	88.9	88.9	1.53
Wrapping pots and pans	62	72	86.1	26	30	86.7	86.7	39	45	86.7	86.7	45
Wrapping silver	09	11	81.8	02	02	100.0	100.0	02	02	100.0	100.0	02
Cleaning stations	13	16	81.3	30	35	85.7	85.7	06	08	75.0	75.0	08
Walking loaded	12	15	80.0	12	15	80.0	80.0	29	34	85.3	85.3	34
Walking empty	10	13	76.9	09	10	90.0	90.0	20	25	80.0	80.0	25
Cleaning kitchen	..	..	..	03	03	100.0	100.0	14	17	82.4	82.4	17
Cleaning dining room	09	10	90.0	07	08	87.5	87.5	02	03	66.7	66.7	03
Miscellaneous work	..	..	..	..	..	..	..	15	17	88.2	88.2	17
Unavoidable delay	..	..	..	..	..	..	..	02	02	100.0	100.0	02
Nonproductive	..	..	..	..	..	..	..	..	..	..	..	..
Total (or average) warewashing	1.94	2.46	78.9	2.52	3.09	81.6	81.6	2.65	3.47	76.4	76.4	3.47

Table 10 continued on page 58.

See footnotes at end of table.

TABLE 10.—*Productive and actual restaurant employee man-hours per 100 customers served in 6 family-type restaurants studied*
—Continued

Department and activity	Restaurant E				Restaurant F				Average	
	Productive time per 100 customers ¹	Actual time per 100 customers	Per- formance index	Productive time per 100 customers ¹	Actual time per 100 customers	Per- formance index	Productive time per 100 customers ¹	Actual time per 100 customers	Productive time per 100 customers ¹	Actual time per 100 customers
DIRECT LABOR										
Customer service:	Man-hours	Man-hours	Percent	Man-hours	Man-hours	Percent	Man-hours	Man-hours	Man-hours	Percent
Walking loaded	1 62	1 97	82.2	1 53	1 78	85.0	1 72	1 96	87.8	
Walking empty	1 98	2 25	88.0	1 07	1 31	81.7	1 55	1 84	84.2	
Serving customers	2 10	2 53	83.0	1 53	1 80	85.0	2 03	2 35	86.4	
Clearing tables	1 09	1 34	81.3	.63	.74	83.1	.64	.99	84.8	
Setting up tables	.24	.31	77.4	.07	.08	87.5	.12	.14	85.7	
Picking up orders	.49	.59	83.1	.50	.59	84.7	.58	.67	86.6	
Miscellaneous work	2 86	3 45	82.9	1 64	1 92	85.4	2 28	2 64	86.4	
Unavoidable delay	.31	.31	100.0	.18	.18	100.0	.36	.36	100.0	
Nonproductive	..	1 84	..	..	1 15	..	..	1 15	..	
Total (or average)	10 69	14 59	73.3	7 15	9 55	74.9	9 48	12 10	78.3	
customer service	..	..	..	..	..	..	..	..	..
Total (or average)	17 07	23 13	73.8	13 90	18 43	75.4	16 26	20 86	77.9	
direct labor	..	..	..	..	..	..	..	..	..
INDIRECT LABOR³										
Storeroom attendants	..	.36	..	..	.22	..	..	.22	..	
Cashiers	..	1 62	..	..	1 04	..	..	1 43	..	
Housekeepers and	..	..	..	..	..	..	..	..	..
repairmen	..	65	..	..	1 45	..	..	49	..	
Managers	..	4 00	..	..	1 43	..	..	2 63	..	
Total (or average)	..	6 63	..	..	4 14	..	..	4 77	..	
indirect labor	..	..	..	..	..	..	..	..	..

¹ "Productive time per 100 customers" was developed by the application of work sampling percentages, performance rating factors, and a personal and fatigue allowance to the "actual time per 100 customers."

² Data for the salad department in this restaurant were excluded because of an insufficient number of observations and the small product volume.

³ Productive time for indirect labor was not developed. (Refer to section entitled "Man-hour Requirements in the Restaurants Studied.")

TABLE 11.—Productive and actual restaurant employee man-hours per 100 customers served in 7 family-type restaurants studied

Department and activity	Restaurant G				Restaurant H				Restaurant I				Restaurant J			
	Productive time per 100 customers	Actual time per 100 customers	Per-100 formance index	Percent	Productive time per 100 customers	Actual time per 100 customers	Per-100 formance index	Percent	Productive time per 100 customers	Actual time per 100 customers	Per-100 formance index	Percent	Productive time per 100 customers	Actual time per 100 customers	Per-100 formance index	Percent
DIRECT LABOR																
Meat and Vegetable:																
Preparing meat and vegetables	1.97	2.32	84.9	75.4	1.56	1.73	90.2	74.6	3.42	3.73	91.7	79.7	3.37	3.76	89.6	89.6
Cooking	1.67	1.89	88.3		2.70	2.87	94.1		4.55	4.76	95.6		2.27	2.37	95.7	
Finishing orders	2.27	2.68	84.7		89	89.9	91.7		2.64	2.88	91.7		2.05	2.28	93.9	
Cleaning stations	53	62	85.5		21	24	87.5		17	18	94.4		60	66	90.9	
Walking loaded	94	110	85.5		92	101	91.1		90	99	90.9		172	191	90.1	
Walking empty	94	115	81.7		89	104	85.7		50	57	87.7		145	171	85.4	
Miscellaneous work	.99	1.17	84.6		34	50	90.0		90	99	90.9		1.63	1.82	89.6	
Unavoidable delay	02	02	100.0		..	..	..		..	..	..		09	09	100.0	
Nonproductive	..	1.43	..		..	1.86	..		..	2.31	..		3.03	3.03	100.0	
Total (or average) meat and vegetable preparation	9.33	12.38	75.4		7.71	10.34	74.6		13.08	16.41	79.7		13.14	17.63	74.5	
Salad:																
Preparing salads	58	66	87.9		1.73	1.82	95.1		1.65	1.94	85.1		85	97	87.6	
Assembling salads	49	56	87.5		82	87	94.3		1.67	1.97	83.8		97	111	87.4	
Cleaning stations	13	15	86.7		84	89	94.4		57	67	85.1		52	64	81.2	
Walking loaded	12	13	92.3		26	28	92.8		37	41	90.2		37	45	82.2	
Walking empty	14	16	87.5		21	23	91.3		26	30	86.7		25	28	89.3	
Miscellaneous work	09	10	90.0		32	34	94.1		03	03	100.0		63	63	100.0	
Unavoidable delay	..	..	..		02	02	100.0		..	..	..		..	..	..
Nonproductive	..	12	..		..	09	..		..	72	..		44	44	100.0	
Total (or average) salad preparation	1.55	1.88	82.4		4.20	4.54	92.5		5.07	6.70	75.7		3.25	4.19	77.6	
Warewashing:																
Washing dishes	2.64	3.07	86.0		4.66	5.06	92.1		6.10	6.80	89.7		3.51	3.99	88.0	
Wrapping pots and pans	91	1.05	86.7		1.43	1.55	92.3		2.07	2.31	89.6		70	79	88.6	
Wrapping silver	04	05	80.0		07	08	87.5		18	21	85.7		11	13	84.6	
Cleaning stations	37	45	82.2		45	40	87.5		133	155	85.8		58	69	84.1	
Walking loaded	52	65	80.0		62	74	83.8		139	169	82.2		61	76	80.3	
Walking empty	09	10	90.0		14	16	87.5		77	90	85.6		71	85	83.5	
Cleaning kitchen	06	07	85.7		105	118	90.0		68	79	86.1		31	37	83.8	
Cleaning dining room	42	50	84.0		05	05	100.0		..	2.00	..		01	01	100.0	
Miscellaneous work	..	1.00	..		..	..	..		..	..	..		..	..	..
Unavoidable delay	..	..	..		..	..	..		..	..	..		..	..	..
Nonproductive	..	..	..		..	..	..		..	..	..		..	..	..
Total (or average) warewashing	5.05	6.94	72.8		8.37	10.17	82.3		12.52	16.25	77.0		6.54	9.17	71.3	
Customer service:																
Walking loaded	3.67	4.26	86.2		4.75	5.36	88.5		6.15	6.71	91.7		6.72	7.51	89.5	
Walking empty	2.72	3.32	81.9		2.72	3.19	85.3		5.10	5.79	88.1		5.79	6.77	85.5	
Serving customers	4.52	5.27	85.8		7.82	8.73	88.9		9.31	9.31	93.8		6.92	7.75	89.3	
Cleaning table	1.91	2.21	86.4		2.32	2.63	88.9		1.35	1.52	89.3		1.83	2.04	89.7	
Setting up tables	21	24	87.5		1.36	1.76	88.5		1.52	1.86	94.1		1.44	1.61	89.4	
Picking up orders	1.86	2.18	85.3		2.01	2.41	83.8		1.75	2.18	80.0		48	55	87.3	
Miscellaneous work	5.50	6.42	85.7		4.71	5.36	87.9		4.14	4.69	90.0		3.09	3.73	82.3	
Unavoidable delay	1.06	1.19	100.0		1.67	1.67	100.0		1.39	1.39	100.0		1.65	1.65	100.0	
Nonproductive	..	..	..		..	..	..		..	..	..		..	..	..
Total (or average) customer service	21.45	26.15	82.0		27.36	34.92	78.4		29.13	35.59	81.8		27.92	41.36	67.5	

See footnotes at end of table.

Table 11 continued on page 60.

11.—*Productive and actual restaurant employee man-hours per 100 customers served in 7 family-type restaurants studied*
—Continued

Department and activity	Restaurant G			Restaurant H			Restaurant I			Restaurant J		
	Productive time per 100 customers ¹	Actual time per 100 customers	Per-100 formance index	Productive time per 100 customers ¹	Actual time per 100 customers	Per-100 formance index	Productive time per 100 customers ¹	Actual time per 100 customers	Per-100 formance index	Productive time per 100 customers ¹	Actual time per 100 customers	Per-100 formance index
DIRECT LABOR	Man-hours	Man-hours	Percent	Man-hours	Man-hours	Percent	Man-hours	Man-hours	Percent	Man-hours	Man-hours	Percent
Bar:												
Filling beverage order	1.63	1.89	86.2	1.25	1.43	87.4	2.01	2.22	90.5	2.86	3.22	88.8
Making change	.20	.26	76.9	.03	.04	75.0	.66	.80	82.5	.94	1.15	81.7
Walking loaded	.16	.19	84.2	.17	.21	81.0	.37	.41	90.2	.20	.22	90.9
Washing glasses	.47	.57	82.4	.32	.37	86.5	.33	.38	86.8	.16	.16	84.2
Clearing bar	.04	.05	80.0	.32	.35	88.6	.27	.30	90.0	1.39	1.55	88.7
Miscellaneous work	.16	.19	84.2	.31	.35	88.6	.16	.18	88.9	.33	.37	89.2
Unavoidable delay	.41	.47	87.2	.37	.41	90.2	.62	.68	91.2	.53	.59	88.8
Nonproductive	..	..	..	..	..	..	..	..	..	..	..	..
Total (or average) bar	3.07	5.80	54.8	2.45	3.33	61.6	4.42	7.22	61.2	6.41	9.40	68.2
Total direct labor	40.45	52.95	76.4	50.09	63.30	79.1	64.22	82.17	78.2	57.26	81.75	70.0
INDIRECT LABOR:												
Storeroom attendants	..	.31	..	..	.28	..	..	.12	..	..	1.06	..
Cashiers	..	3.80	..	..	2.23	..	..	3.46	..	..	1.03	..
Housekeepers and repairmen	..	..	..	..	..	..	..	..	..	..	..	..
Managers	..	8.65	..	..	11.49	..	..	3.77	..	..	97	..
Total (or average)	..	12.76	..	..	14.00	..	..	13.78	..	..	12.77	..
Indirect labor	..	..	..	..	..	..	..	..	..	..	..	..
DIRECT LABOR	Man-hours	Man-hours	Percent	Man-hours	Man-hours	Percent	Man-hours	Man-hours	Percent	Man-hours	Man-hours	Percent
Meat and Vegetable:												
Preparing meat and vegetables	1.74	1.95	88.2	.89	1.03	86.4	2.81	3.08	91.2	2.25	2.51	89.6
Cooking	2.13	2.28	93.4	1.45	1.62	89.5	4.00	4.19	95.5	2.67	2.85	93.7
Filling orders	1.30	1.45	89.7	1.56	1.84	84.8	3.70	4.05	91.4	2.06	2.31	89.2
Cleaning stations	.14	.16	87.5	.11	.13	84.6	.79	.86	91.9	.41	.41	87.8
Walking loaded	.54	.60	90.0	.37	.42	86.5	1.57	1.73	90.8	.99	1.10	90.0
Walking empty	.65	.76	85.5	.35	.42	83.3	2.59	2.96	87.5	1.05	1.23	85.4
Miscellaneous work	1.16	1.29	89.9	.56	.65	86.2	1.98	2.14	91.5	1.11	1.24	89.5
Unavoidable delay	.08	.08	100.0	.02	.02	100.0	.04	.04	100.0	.04	.04	100.0
Nonproductive	..	..	..	..	..	..	..	..	..	..	..	..
Total (or average) meat and vegetable preparation	7.74	10.52	73.6	5.26	7.10	74.1	17.46	22.73	76.8	10.53	13.87	75.9

Salad.

Preparing salads	88	96	91.7	47	55	85.5	2.09	2.50	83.6	1.18	1.33	88.7
Assembling salads	62	69	88.9	1.33	1.33	85.0	1.80	1.91	83.8	1.21	1.21	85.0
Cleaning stations	17	19	88.5	46	54	85.2	1.14	1.36	86.7	52	57	86.7
Walking loaded	31	35	88.6	43	50	86.0	1.17	1.40	83.6	49	57	86.0
Walking empty	21	25	84.0	44	44	81.8	1.09	1.36	80.1	37	45	82.2
Miscellaneous work	26	29	88.7	77	91	84.6	1.09	1.36	84.2	37	43	86.0
Unavoidable delay	04	04	100.0	..	..	..	08	08	100.0	03	03	100.0
Nonproductive	..	..	..	..	..	..	..	..	..	..	..	..
Total (or average)	2.49	3.15	79.0	3.62	4.84	74.8	7.81	11.32	69.0	4.00	5.23	76.5

Warewashing:

Washing dishes	2.75	3.18	86.5	3.78	4.24	89.2	7.78	9.19	84.7	4.46	5.08	87.8
Washing pots and pans	.71	.82	86.6	.37	.40	92.5	3.49	4.13	84.5	1.38	1.58	87.3
Wrapping silver	..	..	..	..	..	..	..	..	..	..	..	..
Cleaning stations	.18	.22	81.8	.01	.01	100.0	.22	.27	81.5	.12	.14	85.7
Walking loaded	.92	1.10	83.6	.31	.35	88.5	1.90	2.34	82.2	.98	.98	83.7
Walking empty	.59	.73	80.8	.41	.49	83.7	1.79	2.30	77.8	.85	1.05	81.0
Cleaning kitchen	.29	.35	82.9	.27	.31	87.5	.85	1.05	81.0	.45	.53	84.9
Cleaning dining room	.03	.04	75.0	.07	.08	87.5	..	..	..	.02	.03	86.7
Miscellaneous work	.86	1.04	82.7	.36	.42	85.7	1.58	1.95	81.0	.75	.89	84.3
Unavoidable delay	04	04	100.0	..	..	..	..	..	..	.01	.01	100.0
Nonproductive	..	..	..	..	..	..	..	..	..	..	..	..
Total (or average)	6.37	9.18	89.4	5.58	7.12	78.4	17.61	23.45	75.1	8.86	11.75	75.4

Customer service:

Walking loaded	5.22	5.96	87.6	4.79	5.51	86.9	6.12	7.42	82.5	5.35	6.10	87.7
Walking empty	4.53	5.38	88.2	3.24	3.91	82.9	6.19	7.85	78.9	4.33	5.17	83.8
Serving customers	4.36	4.93	88.4	4.65	5.38	85.4	8.43	10.26	74.0	6.48	7.40	87.6
Cleaning table	1.76	2.02	87.1	2.57	2.95	87.1	2.86	3.48	82.2	2.09	2.40	87.1
Setting up tables	.96	1.10	87.3	.38	.44	86.4	1.21	1.47	82.3	.90	1.02	88.2
Picking up orders	.81	.91	89.0	.99	1.14	86.8	2.73	3.33	82.0	1.49	1.71	87.1
Miscellaneous work	4.48	5.11	87.7	4.49	5.16	87.0	4.55	5.51	82.6	4.42	5.70	87.5
Unavoidable delay	1.46	1.46	100.0	.88	.88	100.0	2.84	2.84	100.0	1.56	1.56	100.0
Nonproductive	..	..	..	..	..	..	..	..	..	..	..	..
Total (or average)	23.58	32.75	72.0	21.99	28.54	77.0	34.93	50.92	68.6	26.62	35.75	74.5

Bar:

Filling beverage order	78	98	79.6	88	1.02	86.3	1.74	2.00	87.0	1.58	1.83	86.3
Making change	24	33	72.7	07	.09	77.8	.03	.03	100.0	.31	.38	81.6
Walking loaded	10	12	83.3	.07	.08	87.9	.17	.20	85.0	.16	.18	83.9
Walking empty	24	31	77.8	.02	.04	83.0	.77	.86	82.8	.47	.53	83.9
Washing glasses	21	27	80.0	.26	.31	83.9	.20	.23	86.5	.22	.26	83.7
Cleaning bar	26	35	80.0	.11	.13	84.6	.52	.59	86.1	.43	.48	83.6
Miscellaneous work	30	37	81.1	.23	.27	85.1	..	..	..	..	..	..
Unavoidable delay	..	..	..	..	..	..	..	..	..	..	..	..
Nonproductive	..	..	..	..	..	..	..	..	..	..	..	..
Total (or average) bar	2.15	4.32	49.8	1.74	2.67	65.2	3.97	7.29	54.5	3.46	5.69	60.8
Total (or average)	42.33	59.92	70.6	38.19	50.27	76.0	81.78	115.71	70.7	53.47	72.21	74.0

INDIRECT LABOR:

Storeroom attendants	..	1.31	..	..	1.62	..	..	75	..	..	78	..
Cashiers	..	3.25	..	..	1.43	..	..	5.23	..	..	2.92	..
Housekeepers and	..	3.13	..	..	.91	..	..	.61	..	..	1.34	..
Repairmen	..	9.18	..	..	8.57	..	..	6.05	..	..	8.58	..
Managers	..	..	..	..	..	..	..	..	..	..	..	..
Total (or average)	..	16.87	..	..	12.53	..	..	12.64	..	..	13.62	..
Indirect labor	..	..	..	..	..	..	..	..	..	..	..	..

* Productive time per 100 customers" was developed by the application of work sampling percentages, performance rating factors, and a personal and fatigue allowance to the "actual time per 100 customers."

* Productive time for indirect labor was not developed. (Refer to section entitled "Man-hour Requirements in the Restaurants Studied.")

TABLE 12.—Areas and percentages of total areas, by function, for 6 family-type restaurants studied

Area description	Restaurant A			Restaurant B			Restaurant C			Restaurant D		
	Area	Percentage of total area	Square feet	Area	Percentage of total area	Square feet	Area	Percentage of total area	Square feet	Area	Percentage of total area	Square feet
Seating area:												
Dining room	3,052	36.8	2,174	44.1	44.1	3,009	38.3	38.3	2,259	37.0	37.0	2,259
Cocktail lounge	210	2.5	--	--	--	629	6.9	6.9	--	--	--	--
Bar	547	6.6	--	--	--	60	.7	.7	--	--	--	--
Total, seating area	3,809	45.9	2,174	44.1	44.1	3,698	40.9	40.9	2,259	37.0	37.0	2,259
Kitchen area:												
Meat and vegetable cooking	557	6.7	266	5.4	5.4	446	4.9	4.9	271	4.4	4.4	271
Meat and vegetable preparation	222	2.7	140	2.8	2.8	582	6.5	6.5	161	2.6	2.6	161
Salad preparation	112	1.3	192	3.9	3.9	80	.9	.9	62	1.0	1.0	62
Pot and pan washing	40	.5	27	.5	.5	54	.6	.6	85	1.4	1.4	85
Dishroom	223	2.7	218	4.4	4.4	184	2.0	2.0	177	2.9	2.9	177
Waiter pickup	177	2.1	209	4.3	4.3	72	.8	.8	95	1.6	1.6	95
Bakery	--	--	--	--	--	--	--	--	97	1.6	1.6	97
Total, kitchen area	1,331	16.0	1,052	21.3	21.3	1,418	15.7	15.7	948	15.5	15.5	948
Storage area:												
Walk-in cooler	63	.8	127	2.6	2.6	185	2.0	2.0	56	.9	.9	56
Walk-in freezer	--	--	47	.9	.9	149	1.6	1.6	45	.7	.7	45
Storeroom	179	2.2	266	5.4	5.4	660	7.3	7.3	721	11.8	11.8	721
Liquor storage	136	1.6	--	--	--	--	--	--	--	--	--	--
Miscellaneous storage	154	1.9	33	.7	.7	214	2.4	2.4	--	--	--	--
Total, storage area	537	6.5	473	9.6	9.6	1,208	13.3	13.3	822	13.4	13.4	822
Other areas:												
Customer lounge	161	1.9	111	2.2	2.2	434	4.8	4.8	313	5.1	5.1	313
Public restrooms	411	5.0	148	3.0	3.0	483	5.3	5.3	209	3.4	3.4	209
Checkroom	--	--	--	--	--	55	.6	.6	--	--	--	--
Cashier	84	1.0	40	.8	.8	65	.7	.7	34	.6	.6	34
Waiter stations	--	--	--	--	--	--	--	--	106	1.7	1.7	106
Employee lockers and restrooms	400	4.9	224	4.5	4.5	237	2.6	2.6	390	6.4	6.4	390
Employee dining	--	--	77	1.6	1.6	--	--	--	55	.9	.9	55
Equipment room	44	.5	96	1.9	1.9	--	--	--	410	6.7	6.7	410
Office	58	.7	58	1.2	1.2	134	1.5	1.5	48	.8	.8	48
Miscellaneous	1,460	17.6	482	9.8	9.8	1,315	14.6	14.6	522	8.5	8.5	522
Total, other areas	2,618	31.6	1,236	25.0	25.0	2,723	30.1	30.1	2,087	34.1	34.1	2,087
Total, all areas	8,295	100.0	4,935	100.0	100.0	9,047	100.0	100.0	6,116	100.0	100.0	6,116
Capacity:												
Dining room	155	116	116	116	116	172	172	172	112	112	112	112
Cocktail lounge	40	--	--	--	--	42	42	42	--	--	--	--
Bar	16	--	--	--	--	9	9	9	--	--	--	--

Area description	Restaurant E		Restaurant F		Average	
	Area	Percentage of total area	Area	Percentage of total area	Area	Percentage of total area
Seating area:	<i>Square feet</i>		<i>Square feet</i>		<i>Square feet</i>	
Dining room	2,974	32.3	3,495	51.1	2,827	33.2
Cocktail lounge	--	--	--	--	420	4.9
Bar	--	--	--	--	304	3.6
Total, seating area	2,974	32.3	3,495	51.1	3,551	41.7
Kitchen area:						
Meat and vegetable cooking	439	4.8	379	5.5	393	4.6
Meat and vegetable preparation	328	3.6	--	--	287	3.4
Salad preparation	212	2.3	166	2.4	137	1.6
Pot and pan washing	113	1.2	196	2.9	86	1.0
Dishroom	360	3.9	180	2.6	224	2.6
Waiter pickup	492	5.4	99	1.4	191	2.2
Bakery	703	7.6	196	2.9	332	3.9
Total, kitchen area	2,647	28.8	1,216	17.7	1,650	19.3
Storage area:						
Walk-in cooler	540	5.9	98	1.4	179	2.1
Walk-in freezer	65	.7	38	.6	69	.8
Storeroom	540	5.9	220	3.2	431	5.0
Liquor storage	--	--	--	--	136	1.6
Miscellaneous storage	--	--	40	.6	110	1.3
Total, storage area	1,145	12.5	396	5.8	925	10.8
Other areas:						
Customer lounge	--	--	181	2.6	240	2.8
Public restrooms	277	3.0	216	3.2	291	3.4
Checkroom	--	--	--	--	55	.6
Cashier	64	.7	35	.5	54	.6
Waiter stations	150	1.6	70	1.0	109	1.3
Employee lockers and restrooms	210	2.3	484	7.1	324	3.8
Employee dining	--	--	--	--	66	.8
Equipment room	478	5.2	--	--	257	3.0
Office	175	1.9	90	1.3	94	1.1
Miscellaneous	1,072	11.7	660	9.7	919	10.8
Total, other areas	2,426	26.4	1,736	25.4	2,409	28.2
Total, all areas	9,192	100.0	6,843	100.0	8,535	100.0
Capacity:	<i>Number of seats</i>		<i>Number of seats</i>		<i>Number of seats</i>	
Dining room	178		218		159	
Cocktail lounge	--		--		41	
Bar	--		--		13	

¹ Area per seat is based on the average dining room seating, with the exception of the cocktail lounge and bar.

TABLE 13.—Areas and percentages of total areas, by function, for 7 occasion-type restaurants studied

Area description	Restaurant G			Restaurant H			Restaurant I			Restaurant J		
	Area	Percentage of total area	Square feet	Area	Percentage of total area	Square feet	Area	Percentage of total area	Square feet	Area	Percentage of total area	Square feet
Seating area:												
Dining room	2,319	22.7	4,378	291	2.6	216	216	1.7	2,973	3,762	22.8	39.3
Cocktail lounge	--	--	--	--	--	--	479	3.7	980	272	3.7	10.2
Bar	305	3.0	--	--	--	--	327	2.5	272	272	2.5	2.8
Total, seating area	2,624	25.7	4,378	38.6	38.6	3,779	29.0	29.0	5,014	52.3	52.3	
Kitchen area:												
Meat and vegetable cooking	305	3.0	291	2.6	2.6	216	216	1.7	377	377	1.7	3.9
Meat and vegetable preparation	362	3.6	--	--	--	319	319	2.4	210	210	2.4	2.2
Salad preparation	116	1.1	138	1.2	1.2	124	124	1.0	287	287	1.0	3.0
Pot and pan washing	75	.8	77	.7	.7	65	65	.5	27	27	.5	.3
Dishroom	270	2.6	239	2.1	2.1	577	577	4.4	328	328	4.4	3.4
Waiter pickup	265	2.6	394	3.4	3.4	367	367	2.8	213	213	2.8	2.2
Bakery	--	--	--	--	--	--	--	--	396	396	--	4.2
Total, kitchen area	1,393	13.7	1,139	10.0	10.0	1,668	12.8	12.8	1,838	19.2	12.8	19.2
Storage area:												
Walk-in cooler	155	1.5	108	1.0	1.0	349	349	2.7	190	190	2.7	2.0
Walk-in freezer	155	1.5	54	.5	.5	90	90	.7	70	70	.7	.7
Storeroom	707	6.9	311	2.7	2.7	1,928	1,928	14.7	398	398	14.7	4.2
Liquor storage	560	5.5	--	--	--	875	875	6.7	109	109	6.7	1.1
Miscellaneous storage	365	3.6	1,836	16.2	16.2	112	112	.9	164	164	.9	1.7
Total, storage area	1,942	19.0	2,309	20.4	20.4	3,354	25.7	25.7	931	9.7	25.7	9.7
Other areas:												
Customer lounge	722	7.1	298	2.6	2.6	268	268	2.0	194	194	2.0	2.1
Public restrooms	204	2.0	278	2.5	2.5	310	310	2.4	148	148	2.4	1.5
Checkroom	107	1.0	98	.9	.9	97	97	.7	60	60	.7	.6
Cashier	23	.2	30	.3	.3	16	16	.1	60	60	.1	.6
Waiter stations	62	.6	60	.5	.5	--	--	--	210	210	--	2.2
Employee lockers and restrooms	305	3.0	150	1.3	1.3	595	595	4.6	366	366	4.6	3.8
Employee dining	--	--	--	--	--	--	--	--	77	77	--	.8
Equipment room	307	3.0	1,065	9.4	9.4	90	90	.7	145	145	.7	1.5
Office	238	2.3	266	2.3	2.3	228	228	1.7	58	58	1.7	.6
Miscellaneous	2,277	22.4	1,270	11.2	11.2	2,643	2,643	20.3	482	482	20.3	5.1
Total, other areas	4,245	41.6	3,515	31.0	31.0	4,247	32.5	32.5	1,800	18.8	32.5	18.8
Total, all areas	10,204	100.0	11,341	100.0	100.0	13,048	100.0	100.0	9,583	100.0	100.0	100.0
Capacity:												
Dining room	253	253	324	324	324	199	199	199	339	339	339	339
Cocktail lounge	--	--	--	--	--	40	40	40	48	48	48	48
Bar	17	17	--	--	--	14	14	14	18	18	14	18

Area description	Restaurant K		Restaurant L		Restaurant M		Average	
	Area	Percentage of total area	Area	Percentage of total area	Area	Percentage of total area	Area	Percentage of total area
Seating area:	Square feet		Square feet		Square feet		Square feet	
Dining room	2,280	25.4	4,535	43.3	4,037	36.2	3,469	29.6
Cocktail lounge	760	8.4	491	4.7	1,676	15.0	877	7.5
Bar	400	4.4	247	2.4	--	--	310	2.7
Total, seating area	3,440	38.2	5,273	50.4	5,713	51.2	4,656	39.8
Kitchen area:								
Meat and vegetable cooking	408	4.5	335	3.2	557	5.0	355	3.0
Meat and vegetable preparation	432	4.8	180	1.7	284	2.5	298	2.5
Salad preparation	242	2.7	178	1.7	247	2.2	190	1.6
Pot and pan washing	46	.5	51	.5	90	.8	62	.5
Dishroom	225	2.5	287	2.7	302	2.7	318	2.7
Waiter pickup	275	3.0	549	5.3	298	2.7	337	2.9
Bakery	--	--	--	--	--	--	396	3.5
Total, kitchen area	1,628	18.0	1,580	15.1	1,778	15.9	1,956	16.7
Storage area:								
Walk-in cooler	297	3.3	237	2.2	559	5.0	271	2.3
Walk-in freezer	66	.7	51	.5	225	2.0	102	.9
Storeroom	597	6.6	141	1.3	122	1.1	601	5.1
Liquor storage	200	2.2	70	.7	240	2.2	342	2.9
Miscellaneous storage	80	.9	90	.9	159	1.4	401	3.5
Total, storage area	1,240	13.7	589	5.6	1,305	11.7	1,717	14.7
Other areas:								
Customer lounge	468	5.2	141	1.3	523	4.7	373	3.2
Public restrooms	164	1.8	304	2.9	484	4.3	270	2.3
Checkroom	99	1.1	--	--	107	1.0	95	.8
Cashier	20	.2	55	.5	32	.3	34	.3
Waiter stations	163	1.8	88	.8	28	.3	102	.9
Employee lockers and restrooms	--	--	138	1.3	--	--	311	2.7
Employee dining	--	--	--	--	--	--	77	.7
Equipment room	448	5.0	122	1.2	--	--	363	3.1
Office	225	2.5	301	2.9	467	4.2	255	2.2
Miscellaneous	1,133	12.5	1,878	18.0	716	6.4	1,486	12.6
Total, other areas	2,720	30.1	3,027	28.9	2,357	21.2	3,366	28.8
Total, all areas	9,028	100.0	10,469	100.0	11,153	100.0	11,695	100.0
Capacity:								
Dining room	235		363		208		274	
Cocktail lounge	46		32		90		51	
Bar	33		14		16		19	

¹ Area per seat is based on the average dining room seating, with the exception of the cocktail lounge and bar.